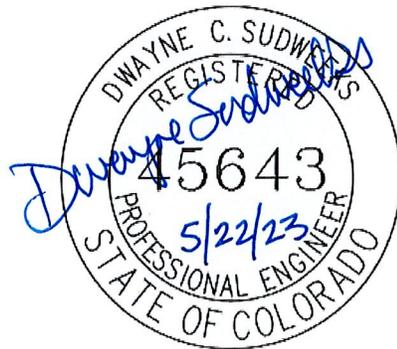


**SPECIFICATIONS**

**FOR**

**Murray Ward Meetinghouse HVAC**  
**1705 Murray Drive**  
**Colorado Springs, CO 80915**  
**Project # 503476023020101**

May 2023



Prepared  
by

Engineered Systems Associates  
1355 East Center  
Pocatello, Idaho 83201  
208-233-0501

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# INVITATION TO BID (U.S.)

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## 1. CONTRACTORS INVITED TO BID THE PROJECT:

JM Mechanical - (435) 563-6267 – Max – [max@jmmech.com](mailto:max@jmmech.com)  
Holbrook Service – David King - (719) 888-0612 – [sjohnston@holbrookservice.com](mailto:sjohnston@holbrookservice.com)  
Haynes Mechanical Systems – (303) 779-0781 – [mkoenig@haynesmechanical.com](mailto:mkoenig@haynesmechanical.com)  
Colorado Mechanical Systems – (719) 309-3829 – [estimating@coloradomech.com](mailto:estimating@coloradomech.com)

## 2. PROJECT:

Murray Ward Meetinghouse HVAC

## 3. LOCATION:

1705 Murray Drive, Colorado Springs, CO 80915

## 4. OWNER:

The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole  
c/o Meetinghouse Project Management Office  
50 E. North Temple Street, 12th Floor  
Salt Lake City, UT 84150-0012

## 5. CONSULTANT:

Engineered Systems Associate  
1355 East Center  
Pocatello, ID 83201

## 6. DESCRIPTION OF PROJECT:

- A. The LDS Murray meetinghouse mechanical equipment was vandalized including seven (7) exterior condensing units. The six (6) associated gas-fired furnaces and two (2) air handling units have exceeded their useful life expectancy. It is proposed that the existing condensing units, furnaces, air handling units, DX coils and controls be replaced. The air handling units will be replaced with four (4) gas-fired furnaces each. The existing distribution ductwork will remain. The controls will be upgraded to LCBS. The plumbing scope includes gas and condensate piping to furnaces. The electrical scope includes power to the furnaces and condensing units.
- B. There will be two bid allowances to be included in each bid. The bid price for these items will be provided by addendum.
  1. All Furnaces, Cooling Coils and condensing units have been pre-ordered by the owner, but will be paid for, received, and installed by the contractor.
  2. All Concrete work, fencing, patching and repairing of walls and ceilings will be preformed by a local general contractor.

Contractor shall include the allowance for this work in their bid. Contractor can include standard mark-ups to cover warranty, and OH&P.

- C. Mechanical contractors are the Prime Bidders, and may need subcontractors (Electrical, Controls, Test and Balance, etc.) to complete the entire work as described in the specifications and drawings.
- D. Products or systems may be provided under a Value Managed Relationship (VMR) the Owner has negotiated with the supplier. VMR products and systems are indicated as such in

the Specifications.

7. **TYPE OF BID:** Bids will be on a lump-sum basis. Segregated bids will not be accepted.
8. **TIME OF SUBSTANTIAL COMPLETION:** The time limit for substantial completion of this work will be 45 calendar days and will be as noted in the Agreement.
9. **PRE-BID OPENING:** There will be a pre-bid walkthrough at the building site on May 25<sup>th</sup>, 2023, at 10:30 AM.
10. **BID OPENING:** Sealed bids will be received until June 8<sup>th</sup>, 2023, at 1:30 PM at Colorado Springs, CO Project Manager offices, this will be a remote bid through Conslog: At which time bids will be publicly opened and read.
10. **BIDDING DOCUMENTS:**
  - A. Bidding Documents may be examined at the following locations:
    - 1) FM Group
    - 2) ESA Website: [www.engsystems.com](http://www.engsystems.com)
  - B. Bidding Documents are available to invited Contractors with a deposit of \$50 per set. Deposit will be refunded if documents are returned complete and in good condition within five days of bid opening.
11. **BIDDER'S QUALIFICATIONS:** Bidding by the Contractors will be by invitation only.
12. **OWNER'S RIGHT TO REJECT BIDS:** Owner reserves the right to reject any or all bids and to waive any irregularity therein.

END OF DOCUMENT

# INSTRUCTIONS TO BIDDERS (U.S.)

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## 1. DOCUMENTS:

- A. Bidding Documents include Bidding Requirements and proposed Contract Documents. Proposed Contract Documents consist of:
  - 1) Agreement Between Owner and Contractor for Small Project (U.S.)
  - 2) Other documents included by reference
  - 3) Addenda.
- B. Bidding Requirements are those documents identified as such in proposed Project Manual.
- C. Addenda are written or graphic documents issued prior to execution of the Contract which modify or interpret the Bidding Documents. They become part of the Contract Documents as noted in the Agreement Between Owner and Contractor for Small Project (U.S.) upon execution of the Agreement by Owner.

## 2. BIDDER'S REPRESENTATIONS:

- A. By submitting a bid proposal, bidder represents that
  - 1) Bidder has carefully studied and compared Bidding Documents with each other. Bidder understands the Bidding Documents and the bid is fully in accordance with the requirements of those documents,
  - 2) Bidder has thoroughly examined the site and any building located thereon, has become familiar with local conditions which might directly or indirectly affect contract work, and has correlated its personal observations with requirements of proposed Contract Documents, and
  - 3) Bid is based on materials, equipment, and systems required by Bidding Documents without exception.

## 3. BIDDING DOCUMENTS:

- A. Copies
  - 1) Owner will provide the Bidding Documents as set forth in the Invitation to Bid.
  - 2) Partial sets of Bidding Documents will not be issued.
- B. Interpretation or Correction of Bidding Documents
  - 1) Bidders will request interpretation or correction of any apparent errors, discrepancies, and omissions in the Bidding Documents.
  - 2) Corrections or changes to Bidding Documents will be made by written Addenda.
- C. Substitutions and Equal Products
  - 1) Equal products may be approved upon compliance with Contract Document requirements.
  - 2) Base bid only on materials, equipment, systems, suppliers or performance qualities specified in the Bidding documents.
  - 3) Where a specified product is identified as a "quality standard", products of other manufacturers that meet the performance, properties, and characteristics of the specified "quality standard" may be used without specific approval as a substitute.
- D. Addenda. Addenda will be sent to bidders and to locations where Bidding Documents are on file no later than one week prior to bid opening or by fax no later than 48 hours prior to bid opening.

## 4. BIDDING PROCEDURES:

- A. Form and Style of Bids
  - 1) Use Owner's Bid Form.
  - 2) Bid will be complete and executed by authorized representative of Bidder.
  - 3) Do not delete from or add to the information requested on bid form.
  
- B. Submission of Bids
  - 1) Submit bid in sealed opaque envelope containing only bid form.
  - 2) It is bidder's sole responsibility to see that its bid is received at or before the specified time. Bids received after specified bid opening time may be returned to bidders unopened.
  - 3) No oral, facsimile transmitted, telegraphic, or telephonic bids, modifications, or cancellations will be considered.
  
- C. Modification or Withdrawal of Bid
  - 1) Bidder guarantees there will be no revisions or withdrawal of bid amount for 45 days after bid opening.
  - 2) Prior to bid opening, bidders may withdraw bid by written request or by reclaiming bid envelope.
  - 3) Prior to bid opening, bidder may mark and sign on the sealed envelope that bidder acknowledges any or all Addenda.

**5. CONSIDERATION OF BIDS:**

- A. Opening Of Bids - See Invitation to Bid.
  
- B. Acceptance Of Bid
  - 1) No bidder will consider itself under contract after opening and reading of bids until Owner accepts Contractor's Bid Proposal by executing same.
  - 2) Bidder's past performance, organization, subcontractor selection, equipment, and ability to perform and complete its contract in manner and within time specified, together with amount of bid, will be elements considered in award of contract.

**6. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR:**

- A. Agreement form will be "Agreement Between Owner and Contractor for Small Project (U.S.)" provided by Owner.

**7. MISCELLANEOUS:**

- A. Pre-Bid Conference. A pre-bid conference will be held May 25<sup>th</sup>, 2023, at 10:30 AM, at the building.

END OF DOCUMENT

# BID FORM

FOR GENERAL CONTRACT WORK (U.S.)

**PROJECT IDENTIFICATION:**

Murray Ward Meetinghouse HVAC

**OWNER:**

The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole ("Owner")

**CONSULTANT:**

Dwayne Sudweeks  
ESA: Engineered Systems Associates, Inc.  
1355 E. Center St. Pocatello, ID 83202  
(208) 233 0501

## BID

1. In submitting this Bid, Bidder represents that:
  - a. If this Bid is accepted, Bidder will enter into an agreement with Owner to perform and furnish the Work described in the Bidding Documents for the Bid Price and within the Time of Substantial Completion indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
  - b. Bidder has carefully examined the Bidding Documents consisting of the Project Manual containing the Bidding Requirements, the Conditions of the Contract, and the Specifications, entitled Murray Ward Meetinghouse HVAC, the Drawings entitled Murray Ward Meetinghouse HVAC Refurbishing and dated May, 2023, and including sheets numbered ME100, ME101, ME102, ME201, ME202, ME301, ME 302, ME303, and addenda numbers \_\_\_\_\_.
  - c. Bidder has examined the site of the work, existing conditions, and all other conditions affecting the work on the above-named Project.
  - d. Bidder has carefully correlated the information known to Bidder and information and observations obtained from visits to the site with the Bidding Documents.
  - e. Bidder is familiar with federal, State, and local laws and regulations applicable to Project.
  - f. Bidder guarantees there will be no revisions or withdrawal of bid amount for forty-five (45) days after the bid opening.
  
2. Bidder hereby proposes to furnish all materials, labor, equipment, tools, transportations, services, licenses, fees, permits, etc., required by said documents to complete the Work described by the Contract Documents for the lump-sum of: \_\_\_\_\_ Dollars (\$ \_\_\_\_\_).
  
3. Bidder agrees to achieve substantial completion of the Work within the number of days indicated in the Invitation to Bid.

RESPECTFULLY SUBMITTED:

	Signature
	Printed name
	Title
	Company name
	Business Address
Date	City, State, and Zip Code
License No.	Telephone <span style="float: right; border-bottom: 1px solid black; padding-bottom: 5px;">Fax</span>

### CONSTRUCTION MATERIAL ASBESTOS STATEMENT (U.S.)

**PROJECTS FOR:  
THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS,  
a Utah corporation sole**

Building Name: Murray Ward Meetinghouse HVAC

Building Plan Type: HVAC Renovations

Building Address: 1705 Murray Drive, Colorado Springs, CO 80915

Building Owner: The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole.

Project Number: 503476023020101

Completion Date:

As PROJECT CONSULTANT and principal in charge; based on my best knowledge, information, inspection, and belief; I certify that on the above referenced Project, no asbestos-containing building materials were specified in the construction documents or given approval in shop drawings or submittals.

Project Consultant and Principal in Charge (signature) Date

Company Name

As GENERAL CONTRACTOR in charge of construction; based on my best knowledge, information, inspection, and belief; I affirm that on the above-referenced Project, no asbestos-containing building materials were used in the construction.

General Contractor (signature) Date

Company Name

# GENERAL CONDITIONS

## For a Fixed Sum (U.S.)

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### SECTION 1 - GENERAL PROVISIONS

#### 1.1 DEFINITIONS

- A. Adverse Weather: weather conditions that are seasonally abnormal and could not have been reasonably anticipated.
- B. Agreement: the document entitled "Agreement Between Owner and Contractor for a Fixed Sum (U.S.), executed by Owner and Contractor for performance of the Work.
- C. Architect: the entity identified as such in the Agreement.
- D. Change In The Work: a modification to the requirements of the Contract Documents or a delay in Substantial Completion resulting from an instruction from Owner or Architect to Contractor or from another event or circumstance.
- E. Change Order: a written instrument prepared by Architect and signed by Owner, Contractor, and Architect stating their agreement upon the following: (1) the occurrence of a Change in the Work; (2) the amount of the adjustment, if any, in the Contract Sum as a result of the Change in the Work; and (3) the extent of the adjustment, if any, in the Contract Time as a result of the Change in the Work.
- F. Construction Change Directive: a written order prepared by Architect and signed by Architect and Owner which: (1) orders a Change in the Work if the terms of a Change Order cannot be agreed upon prior to performance of a Change in the Work described in Section 7.1 or after occurrence of an event or circumstance described in Section 7.2; and (2) states a proposed basis for adjustment, if any, in the Contract Sum, the Contract Time, or both, resulting from the Change in the Work.
- G. Contract Documents: the documents identified as such in the Agreement.
- H. Contract Sum: the total amount set forth in the Agreement payable by Owner to Contractor for performance of the Work.
- I. Contract Time: the period of time set forth in the Agreement for the Substantial Completion of the Work.
- J. Contractor: the entity identified as such in the Agreement.
- K. Day: calendar day unless otherwise specifically defined.
- L. Direct Costs: actual costs for labor, materials, equipment, insurance, bonds, subcontract costs and onsite supervision relating to the Project. They do not include labor costs for project managers or other off-site administration.
- M. Drawings: the documents identified as such in the Agreement.
- N. Field Change: a written order prepared by Architect and signed by Architect and Contractor for a minor Change in the Work consistent with the general intent of the Contract Documents costing \$1,000 or less, resulting in no time extension, and which is necessary to avoid delaying the Work.
- O. Modification: a written amendment to the Contract Documents in the form of a:
  - 1. Change Order;
  - 2. Construction Change Directive; or
  - 3. Field Change.
- P. Owner: the entity identified as such in the Agreement.

- Q. Project: the total construction designed by Architect of which the Work performed under the Contract Documents may be the whole or a part.
- R. Product Data: standard illustrations, schedules, performance charts, instructions, brochures, diagrams, and other information furnished by Contractor to illustrate details regarding materials or equipment to be used in the Work, or the manner of installation, operation, or maintenance of such materials or equipment.
- S. Project Manual: the document identified as such in the Agreement.
- T. Samples And Mock-ups: physical examples that illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.
- U. Shop Drawings: drawings, diagrams, illustrations, schedules, performance charts, fabrication and installation drawings, setting diagrams, patterns, templates, and other data which illustrate some portion of the Work and confirm dimensions and conformance to the Contract Documents specially prepared by Contractor or any Subcontractor, manufacturer, supplier, or distributor.
- V. Specifications: the documents identified as such in the Agreement.
- W. Subcontractor: any entity supplying labor, materials, equipment, construction or services for the Work under separate contract with Contractor or any other Subcontractor.
- X. Submittals: Shop Drawings, Product Data, Samples and Mock-ups and any other documents or items furnished by Contractor or its Subcontractors to Owner or Architect to demonstrate how any portion of the Work will be accomplished or the type of materials or products that will be used in the Work.
- Y. Substantial Completion: Completion of the Work to a point where Owner can use the Work for its intended purposes. The date of Substantial Completion is the date certified as such by Architect in accordance with the Contract Documents.
- Z. Work: all labor, materials, equipment, construction, and services required by the Contract Documents.
- AA. Written Notice: notice in writing given from one party to the other at the addresses or facsimile numbers listed in the Agreement, or at such other addresses or facsimile numbers as the parties will designate from time to time by Written Notice, and will be effective at the earliest of:
  1. The date of personal delivery to the other party with signed acknowledgment of receipt; or
  2. The date sent by facsimile transmission to the other party provided receipt of the facsimile is verified by an electronic confirmation report by the party sending the facsimile transmission and further provided that a confirmation copy is sent to the other party by courier or by registered or certified mail within twenty-four (24) hours after the time and date of the facsimile transmission; or
  3. The date of receipt by the other party as stated on the return receipt if sent by registered or certified mail, or by courier.

## 1.2 CORRELATION AND INTENT OF CONTRACT DOCUMENTS

- A. The intent of the Contract Documents is to require Contractor to provide all labor, materials, equipment, construction, and services necessary for the proper execution and completion of the Work. The Contract Documents are complementary and what is required by any one will be as binding as if required by all. Contractor will perform the Work in accordance with the requirements expressly set forth in or reasonably inferable from the Contract Documents.
- B. The organization of the Contract Documents is not intended to control Contractor in dividing the Work among Subcontractors or to establish the extent of the Work to be performed by any trade.
- C. Words used in the Contract Documents that have well known technical or trade meanings are used therein in accordance with such recognized meanings.
- D. In the interest of brevity, the Contract Documents may omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

## 1.3 OWNERSHIP AND USE OF CONTRACT DOCUMENTS

The Drawings, the Project Manual, and copies thereof are the property of Owner. Contractor will not use these documents on any other project. Contractor may retain one copy of the Drawings and the Project Manual as a contract record set and will return or destroy all remaining copies following final completion of the Work.

## 1.4 PUBLIC STATEMENTS REGARDING PROJECT

Contractor will not make any statements or provide any information to the media about the Project without the prior written consent of Owner. If Contractor receives any requests for information from media, Contractor will refer such requests to Owner.

## 1.5 OWNERSHIP AND USE OF RENDERINGS AND PHOTOGRAPHS

Renderings representing the Work are the property of Owner. All photographs of the Work, whether taken during performance of the

Work or at completion, are the property of the Owner. The Owner reserves all rights including copyrights to renderings and photographs of the Work. No renderings or photographs shall be used or distributed without written consent of the Owner

## **1.6 NO COMMERCIAL USE OF TRANSACTION OR RELATIONSHIP**

Without the prior written consent of Owner, which Owner may grant or withhold in its sole discretion, neither Contractor nor Contractor's affiliates, officers, directors, agents, representatives, shareholders, members, Subcontractors, Sub-subcontractors or employees shall make any private commercial use of their relationship to Owner or the Project, including, without limitation:

- A. By referring to this Agreement, Owner, or the Project verbally or in any sales, marketing or other literature, letters, client lists, press releases, brochures or other written materials except as may be necessary for Contractor to perform Contractor's obligations under the terms of this Agreement;
- B. By using or allowing the use of any photographs of the Project or any part thereof, or of any service marks, trademarks or trade names or other intellectual property now or which may hereafter be associated with, owned by or licensed by Owner in connection with any service or product; or
- C. By contracting with or receiving money or anything of value from any person or commercial entity to facilitate such person or entity obtaining any type of commercial identification, advertising or visibility in connection with the Project.

Notwithstanding the foregoing, Contractor may include a reference to Owner and the services and equipment provided under this Agreement in a professional résumé or other similar listing of Contractor's references without seeking Owner's written consent in each instance; provided, that such reference to Owner, the services and equipment is included with at least several other similar references and is given no more prominence than such other references.

## **1.7 CONFIDENTIALITY / PROPERTY RIGHTS**

- A. Owner will retain ownership and intellectual property rights in all plans, designs, drawings, documents, concepts, and materials provided by or on behalf of Owner to Contractor and to all work products of Contractor for or relative to Work performed under this Agreement, such products, services, and Work of Contractor constituting works made for hire. Contractor will not reuse any portions of such items provided by Owner or developed by Contractor for Owner pursuant to this Agreement, or disclose any such items to any third party without the prior written consent of Owner. Owner may withhold its consent in its' absolute discretion.
- B. In addition, Contractor shall ensure that Contractor, Subcontractors, and the employees, agents and representatives of Contractor and its Subcontractors maintain in strict confidence, and shall use and disclose only as authorized by Owner all Confidential Information of Owner that Contractor receives in connection with the performance of this Agreement. Notwithstanding the foregoing, Contractor may use and disclose any information to the extent required by an order of any court or governmental authority, but only after it has notified Owner and Owner has had an opportunity to obtain reasonable protection for such information in connection with such disclosure. For purposes of this Agreement, "Confidential Information" means:
  - 1. The name or address of any affiliate, customer or contractor of Owner or any information concerning the transactions of any such person with Owner;
  - 2. Any information relating to contracts, agreements, business plans, budgets or other financial information of Owner to the extent such information has not been made available to the public by the Owner; and
  - 3. Any other information that is marked or noted as confidential by the Owner at the time of its disclosure.

## **1.8 COMPLY WITH INTELLECTUAL PROPERTY RIGHTS OF OTHERS**

Contractor represents and warrants that no Work (with its means, methods, goods, and services attendant thereto), provided to Owner will infringe or violate any right of any third party and that Owner may use and exploit such Work, means, methods, goods, and services without liability or obligation to any person or entity (specifically and without limitation, such Work, means, methods, goods, and services will not violate rights under any patent, copyright, trademark, or other intellectual property right or application for the same).

## **SECTION 2 - OWNER**

### **2.1 OWNER'S DESIGNATED REPRESENTATIVE**

Owner will designate in writing a representative who will have express authority to bind Owner with respect to all matters requiring Owner's approval or authorization.

### **2.2 INFORMATION AND SERVICES REQUIRED OF OWNER**

- A. Owner will be responsible for establishment of property lines and benchmarks for grading.
- B. Owner will furnish to Contractor any information or services it is required to furnish under the Contract Documents with reasonable promptness to avoid delay in the orderly progress of the Work.
- C. Owner will furnish to Contractor a reasonable number of copies of the Drawings, the Project Manual, and the Addenda.

### **2.3 OWNER'S RIGHT TO INSPECT THE WORK**

Owner and its representatives will have the right to inspect any portion of the Work wherever located at any time.

### **2.4 OWNER'S RIGHT TO STOP THE WORK**

If Contractor fails to carry out the Work in accordance with the Contract Documents or fails to correct Work which is not in accordance with the Contract Documents in a timely manner, Owner may order Contractor in writing to stop the Work, or any portion thereof, until the cause for that order has been eliminated.

## **SECTION 3 - CONTRACTOR**

### **3.1 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR**

- A. By executing the Agreement, Contractor represents that it has visited the Project site, familiarized itself with the local conditions under which the Work is to be performed, and correlated its own observations with the requirements of the Contract Documents.
- B. Contractor will carefully review and compare the Contract Documents and any other available information relating to the Project prior to commencing and during performance of each portion of the Work and will immediately report to Architect any errors, inconsistencies, and omissions it discovers.
- C. Should Contractor or any of its Subcontractors become aware of any question regarding the meaning or intent of any part of the Contract Documents prior to commencing that portion of the Work about which there is a question, Contractor will request an interpretation or clarification from Architect before proceeding. Contractor proceeds at its own risk if it proceeds with the Work without first making such a request and receiving an interpretation or clarification from Architect. If neither Contractor nor its Subcontractors become aware of the question until after work on the relevant portion of the Work has commenced, then the following precedence will govern for purposes of determining whether resolution of the question constitutes a Change in the Work:
  - 1. The Agreement takes precedence over all other Contract Documents.
  - 2. The Supplementary Conditions take precedence over the General Conditions.
  - 3. The General Conditions and Supplementary Conditions take precedence over the Drawings and the Specifications.
  - 4. An Addendum or a Modification takes precedence over the document(s) modified by the Addendum or Modification.
  - 5. The Specifications take precedence over the Drawings.
  - 6. Within the Drawings, larger scale drawings take precedence over smaller scale drawings, figured dimensions over scaled dimensions, and noted materials over graphic indications.
- D. Contractor will give Architect notice of any additional drawings, specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work, sufficiently in advance of the need for information so as not to delay the Work.
- E. It is not Contractor's responsibility to ascertain that the Contract Documents are in accordance with requirements of applicable laws, statutes, ordinances, building codes, rules and regulations. However, if Contractor observes that portions of the Contract Documents are at variance with those requirements, Contractor will immediately notify Architect in writing. Contractor will not proceed unless Owner and/or Architect effects Modifications to the Contract Documents required for compliance with such requirements. Contractor will be fully responsible for any work knowingly performed contrary to such requirements and will fully indemnify Owner against loss and bear all costs and penalties arising therefrom.
- F. Contractor will take field measurements and verify field conditions and will compare such field measurements and conditions and other information known to Contractor with the Contract Documents before ordering any materials or commencing construction activities. Contractor will immediately report errors, inconsistencies, and omissions that it discovers to Architect. If Contractor orders materials or commences construction activities before taking field measurements and verifying field conditions, Contractor will not be entitled to any compensation for additional costs to Contractor resulting from field measurements or conditions different from those anticipated by Contractor which would have been avoided had Contractor taken field measurements and verified field conditions prior to ordering the materials or commencing construction activities.
- G. If site conditions indicated in the Contract Documents or other information provided by Owner or Architect to Contractor differ materially from those Contractor encounters in performance of the Work, Contractor will immediately notify Architect in writing of such differing site conditions.
- H. Where the Contract Documents require the Contractor to provide professional services for architecture or engineering, the Contractor shall cause such services to be performed by appropriately licensed professionals.

### **3.2 SUPERVISION OF CONSTRUCTION PROCEDURES**

- A. Contractor will supervise and direct the Work. Contractor will be solely responsible for all construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work. All loss, damage, liability, or cost of correcting defective work arising from the use of any construction means, methods, techniques, sequences or procedures will be borne by Contractor, notwithstanding that such construction means, methods, techniques, sequences or procedures are referred to, indicated or implied by the Contract Documents, unless Contractor has given timely notice to Owner and Architect in writing that such means, methods, techniques, sequences or procedures are not safe or suitable, and Owner has then instructed Contractor in writing to proceed at Owner's risk.
- B. Contractor will utilize its best skill, efforts, and judgment to provide efficient business administration and supervision, to furnish at all times an adequate supply of workers and materials, and to perform the Work in an expeditious and economical manner consistent with the interests of Owner.
- C. Contractor will be responsible for:

1. The proper observance of property lines and set back requirements as shown in the Contract Documents;
  2. The location and layout of the Work as shown in the Contract Documents with respect to the position of the Work on the property and the elevation of the Work in relation to grade; and
  3. Setting and maintaining construction stakes.
- D. Contractor will be responsible to Owner for the acts and omissions of its employees and Subcontractors as well as persons either directly or indirectly employed by Subcontractors.
- E. Contractor will not be relieved of its obligation to perform the Work in accordance with the Contract Documents as a result of any tests, inspections, or approvals by Owner, Architect or their consultants.
- F. Contractor will be responsible for inspection of portions of the Work already completed to determine that such portions are in proper condition to receive subsequent portions of the Work.
- G. Contractor recognizes that the Project site and the surrounding area is frequently visited by the public and is important to Owner's image and function and will maintain the premises free from debris and waste materials resulting from Construction. At the completion of Construction, Contractor shall promptly remove construction equipment, tools, surplus materials, waste materials and debris.

### **3.3 LABOR AND MATERIALS**

- A. Unless otherwise provided in the Contract Documents, Contractor will provide and pay for all labor, materials, equipment, tools, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work.
- B. Contractor will at all times enforce strict discipline and good order among those performing the Work and will not permit employment of any unfit person or anyone not skilled in the tasks assigned to them.
- C. Contractor is fully responsible for the Project and all materials and work connected therewith until Owner has accepted the Work in writing. Contractor will replace or repair at its own expense any materials or work damaged or stolen, regardless of whether it has received payment for such work or materials from the Owner.
- D. Contractor will remedy all damage or loss to any property caused in whole or in part by Contractor, any Subcontractor, or by anyone for whose acts any of them may be liable.
- E. Contractor will be responsible for determining that all materials furnished for the Work meet all requirements of the Contract Documents. Architect may require Contractor to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of Architect, would lead to a reasonable certainty that any material used, or proposed to be used, in the work meets the requirements of the Contract Documents. All such data will be furnished at Contractor's expense. This provision will not require Contractor to pay for periodic testing of different batches of the same material, unless such testing is specifically required by the Contract Documents to be performed at Contractor's expense.
- F. Contractor will coordinate and supervise the work performed by Subcontractors so that the Work is carried out without conflict between trades and so that no trade, at any time, causes delay to the general progress of the Work. Contractor and all Subcontractors will at all times afford each trade, any separate contractor, or Owner, reasonable opportunity for the installation of Work and the storage of materials.
- G. Contractor warrants to Owner that the materials and equipment furnished for the Work will be new unless otherwise specified by the Contract Documents, and that the Work will be free from defects, and will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective in the discretion of Owner. If required by Architect, Contractor will furnish satisfactory evidence as to the kind and quality of the materials and equipment used in performing the Work.
- H. Owner may elect to purchase materials required for the Work. In that event, Contractor will comply with the procedures set forth in the Contract Documents relating to such materials.

### **3.4 COMPLIANCE WITH LAWS**

Contractor will comply with all applicable laws, ordinances, rules, regulations, and orders of any public authorities relating to performance of the Work.

### **3.5 TAXES**

- A. Contractor will pay all sales, use, consumer, payroll, workers compensation, unemployment, old age pension, surtax, and similar taxes assessed in connection with the performance of the Work.
- B. Owner will pay all taxes and assessments on the real property comprising the Project site.

### **3.6 PERMITS AND FEES**

- A. Owner will obtain and pay for all zoning and use permits and permanent easements necessary for completion of the Work.

- B. Contractor will obtain and pay for the building permit, and all other permits, governmental fees, licenses and inspections necessary for the proper execution and completion of the Work.
- C. Contractor will secure any certificates of inspection and of occupancy required by authorities having jurisdiction over the Work. Contractor will deliver these certificates to Architect prior to issuance of the Certificate of Substantial Completion by Architect.

### **3.7 CONTRACTOR'S ON-SITE REPRESENTATIVE**

Contractor will employ a competent representative acceptable to Owner to supervise the performance of the Work. This representative will be designated in writing by Contractor prior to commencement of work and will not be changed prior to final inspection of the Work without prior written consent of Owner. This representative will represent Contractor for all purposes, including communication with Owner.

### **3.8 CONTRACTOR'S CONSTRUCTION SCHEDULES**

- A. Contractor will prepare and submit for Owner's and Architect's information Contractor's construction schedule for the Work in accordance with the requirements of the Contract Documents.
- B. Contractor will prepare and maintain a Submittal schedule which is coordinated with Contractor's construction schedule and sets forth specified times for Architect to review Submittals.

### **3.9 DOCUMENTS AND SUBMITTALS AT THE SITE**

Contractor will keep at the Project site for use by Owner, Architect, or their representatives, a record copy of the Project Manual, the Drawings, all Addenda, and all Modifications. These documents will be maintained in good order and currently marked to record changes and selections made during construction. In addition, Contractor will keep at the Project site one copy of all Submittals.

### **3.10 SUBMITTALS**

- A. Submittals are not Contract Documents and do not alter the requirements of the Contract Documents unless incorporated into the Contract Documents by a Modification.
- B. Contractor will review, approve, and submit to Architect Submittals in accordance with the Contract Documents. By approving Submittals, Contractor represents that it has determined and verified field measurements, field construction criteria, materials, catalog numbers, and similar data, and that it has checked and coordinated each Submittal with the requirements of the Work and of the Contract Documents or will make such determination, verification, check, and coordination prior to commencing the relevant portion of the Work. In reviewing Submittals Architect will be entitled to rely upon Contractor's representation that such information is correct and accurate.
- C. Contractor will inform Architect in writing at the time of submission of any Submittal or portion thereof which deviates from the requirements of the Contract Documents. Contractor will provide Architect with documentation demonstrating to Architect that the Submittal is equal to or better than the specified product or work. Contractor will not be relieved of responsibility for deviations from the requirements of the Contract Documents by Architect's acceptance of a Submittal unless Contractor has informed Architect in writing of the deviation and Architect has incorporated the deviation into the Contract Documents by a Modification.
- D. Contractor will not perform any portions of the Work requiring Submittals until the respective Submittal has been reviewed and accepted in writing by Architect.
- E. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, Owner will be entitled to rely upon such certifications, and neither Owner nor Architect will be expected to make any independent examination with respect thereto.
- F. Submittals not required by the Contract Documents may be returned to Contractor without action.

### **3.11 CUTTING AND PATCHING**

Contractor will be responsible for any cutting, fitting, and patching that may be required to complete the Work and make its parts fit together properly.

### **3.12 ACCESS TO WORK**

Contractor will permit Owner, Architect, their representatives and consultants, access to the Work wherever located at any time.

### **3.13 ROYALTIES AND PATENTS**

Contractor will pay all royalties and license fees required by the Work or by Contractor's chosen method of performing the Work. Contractor will defend and hold Owner harmless from all suits or claims for infringement of any patent, license or other intellectual property rights or any loss on account thereof.

### **3.14 INDEMNIFICATION**

- A. Contractor will indemnify and hold harmless Owner and Owner's representatives, employees, agents, architects, and consultants from and against any and all claims, damages, liability, demands, costs, judgments, awards, settlements, causes of action, losses and expenses (collectively "Claims" or "Claim"), including but not limited to attorney fees, consultant fees, expert fees, copy costs, and other expenses, arising out of or resulting from performance of the Work, attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of real or personal property, including loss of use resulting therefrom, except to the extent that such liability arises out of the negligence of Owner, its representatives, agents, and employees. This indemnity includes, without limitation, indemnification of Owner from all losses or injury to Owner's property, except to the extent that such loss or injury arises out of the negligence of Owner, its representatives, agents, and employees. This indemnity applies, without limitation, to include Claims occurring both during performance of the Work and/or subsequent to completion of the Work. In the event that any Claim is caused in part by a party indemnified hereunder, that party will bear the cost of such Claim to the extent it was the cause thereof. In the event that a claimant asserts a Claim for recovery against any party indemnified hereunder, the party indemnified hereunder may tender the defense of such Claim to Contractor. If Contractor rejects such tender of defense and it is later determined that the negligence of the party indemnified hereunder did not cause all of the Claim, Contractor will reimburse the party indemnified hereunder for all costs and expenses incurred by that party in defending against the Claim. Contractor will not be liable hereunder to indemnify any party for damages resulting from the sole negligence of that party.
- B. In addition to the foregoing, Contractor will be liable to defend Owner in any lawsuit filed by any Subcontractor relating to the Project. Where liens have been filed against Owner's property, Contractor (and/or its bonding company which has issued bonds for the Project) will obtain lien releases and record them in the appropriate county and/or local jurisdiction and provide Owner with a title free and clear from any liens of Subcontractors. In the event that Contractor and/or its bonding company are unable to obtain a lien release, Owner in its absolute discretion may require Contractor to provide a bond around the lien or a bond to discharge the lien, at Contractor's sole expense.
- C. In addition to the foregoing, Contractor will indemnify and hold Owner harmless from any claim of any other contractor resulting from the performance, nonperformance or delay in performance of the Work by Contractor.
- D. The indemnification obligation herein will not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or a Subcontractor under worker's compensation acts, disability benefit acts, or other employee benefit acts.

### **3.15 PROJECT MEETINGS**

Contractor will attend and participate in meetings as required by the Contract Documents.

## **SECTION 4 - ADMINISTRATION OF THE CONTRACT**

### **4.1 ARCHITECT**

In the event that Owner terminates its contractual relationship with Architect, Owner will appoint in writing another architect, whose status under the Contract Documents will be that of the former Architect in all respects.

### **4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT**

- A. Architect will make periodic visits to the site to familiarize itself generally with the progress and quality of the Work and to determine if the Work is proceeding in accordance with the Contract Documents. Although Architect is required to make periodic inspections, it is not required to make exhaustive or continuous onsite inspections. On the basis of its observations while at the site, Architect will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defects and deficiencies in the Work. Architect's failure to observe a defect or deficiency in the Work will not relieve Contractor of its duty to perform the Work in accordance with the Contract Documents.
- B. Architect will review Contractor's payment requests and determine the amounts due Contractor in accordance with Section 9.
- C. Communications between Contractor and Owner relating to the Work will be through Architect. Communications between Owner or Contractor with Architect's consultants relating to the Work will be through Architect. Communications between Owner or Architect and subcontractors relating to the Work will be through Contractor. Communications between Contractor and any separate contractor will be through Architect, except as otherwise specified in the Contract Documents.
- D. Owner and/or Architect will have the right to reject and require removal of the following at Contractor's expense:
  1. Any portion of the Work that does not meet the requirements of the Contract Documents.
  2. Any portion of the Work damaged or rendered unsuitable during installation or resulting from failure to exercise proper protection.
- E. Architect will have authority to suspend the Work, with concurrence of Owner, whenever such suspension may be necessary in its reasonable opinion to insure the proper performance of the Work.
- F. Architect will review Contractor's Submittals and will accept or take other appropriate action regarding the Submittals. Architect's review of the Submittals will be for the limited purpose of checking for general conformance with the Contract Documents and will not be conducted for the purpose of determining the accuracy and completeness of details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of Contractor. Architect's review of Submittals will not relieve Contractor of its obligations under the

Contract Documents. Architect's review of Submittals will not constitute acceptance of safety precautions or construction means, methods, techniques, sequences or procedures. Architect's acceptance of a specific item will not indicate acceptance of an assembly of which the item is a component.

- G. Architect has authority to order Construction Change Directives and Field Changes in accordance with Section 7.
- H. Architect will conduct inspections to determine the dates of Substantial Completion and final completion, will receive and review written guarantees and related documents required by the Contract and assembled by Contractor, and will review and certify or reject Contractor's final payment request.
- I. Architect will be the interpreter of the performance and requirements of the Contract Documents. Architect's interpretations will be in writing or in the form of drawings.
- J. Architect's decisions in matters relating to aesthetic effect will be final if consistent with the Contract Documents and approved by Owner.

## **SECTION 5 - SUBCONTRACTORS**

### **5.1 AWARD OF SUBCONTRACTS FOR PORTIONS OF THE WORK**

- A. Contractor will enter into contracts with Subcontractors to perform all portions of the Work that Contractor does not customarily perform with its own employees.
- B. Contractor will not contract with any Subcontractor who has been rejected by Owner. Contractor will not be required to contract with any Subcontractor against whom it has a reasonable objection.
- C. If Owner rejects any Subcontractor proposed by Contractor, Contractor will propose an acceptable substitute to whom Owner has no reasonable objection.
- D. Contractor will not make any substitution for any Subcontractor that has been accepted by Owner and Architect without the prior written approval of Owner and Architect.

### **5.2 SUBCONTRACTUAL RELATIONS**

- A. Contractor's responsibility for the Work includes the labor and materials of all Subcontractors, including those recommended or approved by Owner. Contractor will be responsible to Owner for proper completion and guarantee of all workmanship and materials under any subcontracts. Any warranties required for such work will be obtained by Contractor in favor of Owner and delivered to Architect. It is expressly understood and agreed that there is no contractual relationship between Owner and any Subcontractor, and under no circumstances will Owner be responsible for the non-performance or financial failure of any Subcontractor or any effects therefrom.
- B. Contractor agrees to pay the Subcontractors promptly upon receipt of payment from Owner for that portion of the funds received which represents the Subcontractor's portion of the Work completed to Contractor's satisfaction for which Owner has made payment.
- C. Contractor will require each Subcontractor to:
  - 1. Be licensed by the state in which the Project is located where such licensing is required by the governing authority;
  - 2. Be bound by the terms of the Contract Documents as far as they are applicable to the Subcontractor's work;
  - 3. Assume toward Contractor the same obligations Contractor has assumed toward Owner, including the prompt payment of its Subcontractors;
  - 4. Submit its applications for payment to Contractor in time to permit Contractor to make timely application to Owner;
  - 5. Execute claim or lien releases or lien waivers for payments made by Contractor; and
  - 6. Make all claims for Changes in the Work to Contractor in the same manner as Contractor is required to make such claims to Owner.

## **SECTION 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

### **6.1 OWNER'S RIGHT TO PERFORM WORK OR AWARD SEPARATE CONTRACTS**

- A. Owner reserves the right to perform work itself or to award separate contracts in connection with the Project.
- B. When separate contracts are awarded, "Contractor" in the Contract Documents in each case will mean the contractor who signs each separate contract.

### **6.2 MUTUAL RESPONSIBILITY**

- A. Contractor will afford other contractors reasonable opportunity to place and store their materials and equipment on site and to perform their work and will properly connect and coordinate its Work with theirs where applicable.
- B. If any part of Contractor's Work depends upon the work of any separate contractor for proper performance or results, Contractor will inspect and promptly report to Architect any apparent discrepancies or defects in such work that render it unsuitable for

proper performance and results. Failure of Contractor to so inspect and report will constitute an acceptance of the work of the separate contractor as fit and proper to receive Contractor's Work, except as to defects not then reasonably discoverable.

- C. Contractor will promptly remedy damage caused by Contractor or any Subcontractor to the completed or partially completed work of other contractors or to the property of Owner or other contractors.

### **6.3 OWNER'S RIGHT TO CLEAN UP**

If a dispute arises among Contractor and separate contractors as to the responsibility under their separate contracts for maintaining the Project free from waste materials and rubbish, Owner may clean the Project, allocate the cost among those responsible as Owner and Architect determine to be just, and withhold such cost from any amounts due or to become due to Contractor.

## **SECTION 7 - CHANGES IN THE WORK**

### **7.1 CHANGES IN THE WORK RESULTING FROM AN INSTRUCTION BY OWNER OR ARCHITECT TO CONTRACTOR**

- A. If Owner or Architect gives Contractor an instruction that modifies the requirements of the Contract Documents or delays Substantial Completion, Contractor may be entitled to an adjustment in the Contract Sum and/or the Contract Time. If compliance with the instruction affects the cost to Contractor to perform the Work, the Contract Sum will be adjusted to reflect the reasonable increase or decrease in cost subject to the conditions set forth in Section 7.1, Paragraphs B through G. If compliance with the instruction delays Substantial Completion, the Contract Time will be extended for a period of time commensurate with such delay subject to the conditions set forth in Section 7.1, Paragraphs B through G and Section 7.3, Paragraph A and Contractor will be paid liquidated damages for the delay as set forth in Section 7.3, Paragraph B.
- B. If Contractor receives an instruction from Owner or Architect that Contractor considers to be a Change in the Work, Contractor, before complying with the instruction, will notify Architect in writing that Contractor considers such instruction to constitute a Change in the Work. If Architect agrees that compliance with the instruction will constitute a Change in the Work, Contractor will furnish a proposal for a Modification in accordance with Section 7.1, Paragraphs C. and D. within ten (10) days.
- C. If Contractor claims that it is entitled to an adjustment in the Contract Sum (including without limitation costs related to a time extension) as a result of an instruction by Owner or Architect, Contractor will furnish a proposal for a Change Order containing a price breakdown itemized as required by Owner. The breakdown will be in sufficient detail to allow Owner to determine any increase or decrease in Direct Costs as a result of compliance with the instruction. Any amount claimed for subcontracts will be supported by a similar price breakdown and will itemize the Subcontractor's profit and overhead charges. Profit and overhead will be subject to the following limitations:
  - 1. The Subcontractor's profit and overhead will not exceed ten (10) percent of its Direct Costs on work performed. Subcontractor's profit and overhead will not exceed five (5) percent on work performed by its sub-subcontractors.
  - 2. Contractor's profit and overhead on work performed by its own crews will not exceed ten (10) percent of its Direct Costs.
  - 3. Contractor's profit and overhead mark up on work performed by its Subcontractors will not exceed five (5) percent of the Subcontractors' charges for such work.
  - 4. Amounts due Owner as a result of a credit change will be the actual net savings to Contractor from the Change in the Work as confirmed by Architect. On credit changes, profit and overhead on the originally estimated work will not be credited back to Owner. If both additions and credits are involved in a single Change in the Work, overhead and profit will be figured on the basis of net increase, if any, related to that Change in the Work.
- D. If Contractor claims that it is entitled to an adjustment in the Contract Time as a result of an instruction from Owner or Architect, Contractor will include in its proposal justification to support Contractor's claim that compliance with the instruction will delay Substantial Completion.
- E. Upon receipt of Contractor's proposal for Modification, Architect and Owner will determine whether to proceed with the Change in the Work. If Architect and Owner determine to proceed with the Change in the Work, they will issue a Change Order, a Construction Change Directive or a Field Change as appropriate.
- F. Contractor agrees that if it complies with an instruction from Owner or Architect without first giving written notice to Architect as provided in Section 7.1., Paragraph B, and receiving a Change Order, Construction Change Directive or Field Change, Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time as a result of the instruction and waives any claim therefor.
- G. If Contractor is instructed to perform work which it claims constitutes a Change in the Work but which Owner and Architect do not agree constitutes a Change in the Work, Contractor will comply with the instruction. Contractor may submit its claim for adjustment to the Contract Sum, the Contract Time, or both as a dispute pursuant to Section 13 within thirty (30) days after compliance with the instruction. Contractor agrees that if it fails to submit its claim for resolution pursuant to Section 13 within thirty (30) days after compliance with the instruction, then Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time as a result of the instruction and waives any claim therefor.
- H. Contractor agrees that it is responsible for submitting accurate cost and pricing data to support its Change Order Proposals. Owner will have the right to examine the Contractor's records to verify the accuracy and appropriateness of the pricing data used to price change order proposals.

### **7.2 CHANGE IN THE WORK RESULTING FROM AN EVENT OR CIRCUMSTANCE**

- A. If an event or circumstance other than an instruction from Owner or Architect affects the cost to Contractor of performing the Work or delays Substantial Completion, Contractor may be entitled to an adjustment in the Contract Sum and/or the Contract Time. If the circumstance or event affects the cost to Contractor to perform the Work and is caused by a willful or negligent act or omission of Owner or Architect, the Contract Sum will be adjusted to reflect the reasonable increase or decrease in Contractor's cost to perform the Work resulting from the event or circumstance, subject to the conditions set forth in Section 7.2, Paragraphs B through F. If the event or circumstance delays Substantial Completion and is described in Section 7.3, Paragraph A, the Contract Time will be extended for a period of time commensurate with such delay subject to the conditions set forth in such section. If the circumstance or event delays Substantial Completion and is caused by a willful or negligent act or omission of Owner or Architect, then Contractor will be compensated for costs incident to the delay in accordance with Section 7.3, Paragraph B. Contractor will not be entitled to any adjustment to the Contract Sum or other damages from Owner as a result of any event or circumstance unless the event or circumstance results from a willful or negligent act or omission of Owner or Architect.
- B. If a Change in the Work results from any event or circumstance caused by the willful or negligent act or omission of Owner or Architect, Contractor will give Owner Written Notice of such event or circumstance within twenty-four (24) hours after commencement of the event or circumstance so that Owner can take such action as is necessary to mitigate the effect of the event or circumstance. Contractor will not be entitled to any adjustment in either the Contract Time or the Contract Sum based on any damages or delays resulting from such event or circumstance during a period more than twenty-four (24) hours prior to Contractor giving such Written Notice to Owner.
- C. Contractor will submit in writing any claims for an adjustment in the Contract Time and/or the Contract Sum resulting from an event or circumstance within the time limits set forth below. In the event that Contractor fails to submit its claim in writing within the time limits set forth below, then Contractor agrees it will not be entitled to any adjustment in the Contract Time or the Contract Sum or to any other damages from Owner due to the circumstance or event and waives any claim therefor.
  - 1. Claims for an adjustment in the Contract Time due to Adverse Weather will be made by the tenth (10th) of the month following the month in which the delay occurred.
  - 2. Claims for an adjustment in the Contract Time and/or the Contract Sum due to any other circumstance or event will be submitted within seven (7) days after the occurrence of the circumstance or event.
- D. If Contractor claims that it is entitled to an adjustment in the Contract Sum (including without limitation costs related to a time extension) because of an event or circumstance resulting from the willful or negligent act or omission of Owner or Architect, Contractor will furnish a proposal for a Change Order containing a price breakdown as described in Section 7.1, Paragraph C. Any amount claimed for increased labor costs as a result of the event or circumstance must be supported by a certified payroll. Any claim for rented equipment or additional material costs must be supported by invoices.
- E. If Contractor claims that it is entitled to an adjustment in the Contract Time as a result of an event or circumstance, Contractor will include with its claim copies of daily logs, letters, shipping orders, delivery tickets, Project schedules, and other supporting information necessary to justify Contractor's claim that the event or circumstance delayed Substantial Completion. If Contractor is entitled to an adjustment in the Contract Time as a result of an event or circumstance caused by the willful or negligent act or omission of Owner or Architect, Contractor will be compensated for all costs related to the delay in accordance with Section 7.3, Paragraph B.
- F. Within thirty (30) days after receipt of Contractor's claim, Architect will either deny the claim or recommend approval to Owner. If Owner approves the claim, the adjustment in the Contract Time and/or Contract Sum will be reflected in a Change Order pursuant to Section 7.5 or a Construction Change Directive pursuant to Section 7.6. If Owner or Architect denies Contractor's claim, Contractor may submit its claim as a dispute pursuant to Section 13 within thirty (30) days of receipt of the denial of the claim. If Contractor fails to submit its claim for resolution pursuant to Section 13 within the thirty (30) day time period, then Contractor agrees it is not entitled to any adjustment in the Contract Time and/ or Contract Sum or any other damages as a result of the event or circumstance and waives any claim therefor.

### 7.3 EXTENSIONS OF TIME

- A. If Substantial Completion of the Project is delayed because of any of the following causes, then the Contract Time will be extended by Change Order for a period of time equal to such delay:
  - 1. Labor strikes or lock-outs;
  - 2. Adverse weather;
  - 3. Unusual delay in transportation;
  - 4. Unforeseen governmental requests or requirements;
  - 5. A Change in the Work resulting from an instruction by Owner or Architect to Contractor subject to the conditions set forth in Section 7.1; or
  - 6. Any other event or circumstance caused by the willful or negligent act or omission of Owner or Architect.
- B. Contractor will not be entitled to any compensation for delay described in Section 7.3, Paragraph A, subparagraphs 1, 2, 3 and 4. For each day of delay in Substantial Completion described in Section 7.3, Paragraph A, subparagraphs 5 and 6, Contractor will be paid liquidated damages in the amount per day set forth in the Supplementary Conditions to compensate Contractor for all damages resulting from any delay including but not limited to damages for general conditions costs, additional job site costs, additional home office overhead costs, disruption costs, acceleration costs, increase in labor costs, increase in subcontract costs, increase in materials costs, and any other costs incident to the delay. Contractor will be entitled to no other compensation relating to the delay.

- C. In no event will any time extension or cost adjustment be given on account of delay which reasonably should have been anticipated by the Contractor or in circumstances where performance of the Work is, was, or would have been, delayed by any other cause for which the Contractor is not entitled to an extension.

#### **7.4 DOCUMENTATION OF CHANGES IN THE WORK**

Every Change in the Work will be documented by a Change Order, a Construction Change Directive or a Field Change. If Owner, Architect and Contractor reach agreement regarding the adjustment in the Contract Sum, if any, and the adjustment in the Contract Time, if any, resulting from a Change in the Work, then the parties will execute a Change Order pursuant to Section 7.5. If Owner, Architect and Contractor cannot reach agreement regarding the adjustment in Contract Sum or the adjustment in Contract Time resulting from a Change in the Work, then Owner and Architect will issue a Construction Change Directive pursuant to Section 7.6. Field Changes require the agreement of Architect and Contractor only.

#### **7.5 CHANGE ORDERS**

Contractor's signature upon a Change Order is Contractor's acknowledgment that it is not entitled to any additional adjustment in the Contract Sum or the Contract Time or any other damages or compensation as a result of the Change in the Work other than that provided for in the Change Order, irrespective of whether a subsequent claim for additional compensation or time extensions relating to the Change in the Work is described as a change in the requirements of the Contract Documents, a delay, a disruption of the Work, an acceleration of the Work, an impact on the efficiency of performance of the Work, an equitable adjustment, or other claim and irrespective of whether the impact of the Change in the Work is considered singly or in conjunction with the impact of other Changes in the Work.

#### **7.6 CONSTRUCTION CHANGE DIRECTIVES**

- A. Contractor will promptly comply with all Construction Change Directives.
- B. Pending final resolution of any adjustment in the Contract Sum or Contract Time relating to a Construction Change Directive, the amounts proposed by Owner in the Construction Change Directive may be included in Contractor's payment requests once the work relating thereto is completed.
- C. If after the work described in the Construction Change Directive is completed, Owner, Architect, and Contractor reach agreement on adjustments in the Contract Sum, Contract Time, or both, such agreement will be reflected in an appropriate Change Order.
- D. If the parties do not reach agreement regarding an adjustment to the Contract Sum, Contract Time, or both relating to the Construction Change Directive within thirty (30) days of the completion of the work described therein, then Contractor may submit its claim for an adjustment pursuant to Section 13 within thirty (30) days of the completion of such work. Contractor agrees that if it fails to submit its claim for resolution pursuant to Section 13 within thirty (30) days of completion of the work described in the Construction Change Directive, then it will not be entitled to an adjustment in Contract Sum or Contract Time resulting from such work except as set forth in the Construction Change Directive and waives any claim therefor.

#### **7.7 FIELD CHANGES**

Architect and Contractor will sign a Field Change order listing the Change In The Work and the Contract Sum including markups before Contractor proceeds with the Field Change.

#### **7.8 WAIVER OF CLAIMS**

Except as set forth in Section 7, Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time or for any damages of any kind whatsoever resulting from an instruction from Owner or Architect, any event or circumstance, or any act or omission of Owner or Architect and Contractor expressly waives any and all claims therefor.

### **SECTION 8 - TIME**

#### **8.1 TIME IS OF THE ESSENCE**

All time limits stated in the Contract Documents are of the essence. By executing the Agreement, Contractor confirms that the Contract Time is a reasonable period for performing the Work. Contractor will proceed expeditiously with adequate resources and will achieve Substantial Completion within the Contract Time.

#### **8.2 COMMENCEMENT OF THE WORK**

Contractor will not commence work on the Project site until the date set forth in the Written Notice to proceed. However, Contractor may enter into subcontracts and secure material for the Project after receipt of the Agreement with Owner's authorized signature. Owner will issue the Written Notice to proceed within forty-five (45) days after Owner receives acceptable bonds and evidence of insurance pursuant to Section 11 unless Owner earlier terminates the Agreement pursuant to Section 14.

#### **8.3 DELAY IN COMPLETION OF THE WORK**

- A. For each day after the expiration of the Contract Time that Contractor has not achieved Substantial Completion, Contractor will pay Owner the amount set forth in the Supplementary Conditions as liquidated damages for Owner's loss of use of the Project

and the added administrative expense to Owner to administer the Project during the period of delay. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay. Owner may deduct any liquidated damages or reimbursable expenses from any money due or to become due to Contractor. If the amount of liquidated damages and reimbursable expenses exceeds any amounts due to Contractor, Contractor will pay the difference to Owner within ten (10) days after receipt of a written request from Owner for payment.

- B. At the time Architect certifies that Contractor has achieved Substantial Completion, Architect will identify the remaining items to be completed for final completion of the Work and will establish with Contractor a reasonable time for completion of those items. Architect will set forth the items to be completed and the time established for their completion in a Certificate of Substantial Completion. For each day that Contractor exceeds the time allowed for completion of the items set forth in the Certificate of Substantial Completion, Contractor will pay to Owner as liquidated damages for additional administrative expenses the amount set forth in the Supplementary Conditions. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay in completing such items.

## **SECTION 9 - PAYMENTS AND COMPLETION**

### **9.1 SCHEDULE OF VALUES**

Contractor will submit to Architect a schedule of values which allocates the Contract Sum to various portions of the Work. The schedule of values will be supported by such data to substantiate its accuracy as required by Architect. This schedule, when accepted by Owner and Architect, will be used as a basis for reviewing Contractor's payment requests.

### **9.2 PAYMENT REQUESTS**

- A. Not more than once a month, Contractor will submit a payment request to Architect for Work completed, materials stored on the site, and for materials stored offsite as of the date of the payment request. The amount of the payment request will be based upon the schedule of values and will be equal to the value of the Work completed:
  1. Less retention;
  2. Less all prior amounts paid by Owner to Contractor as part of the Contract Sum; and
  3. Less allowable offsets.

The payment request may include Changes in the Work that have been performed by Contractor and authorized by Owner and/or Architect pursuant to Section 7. If a payment request includes materials stored offsite, Contractor will include with the payment request a list of the materials, the location where they are stored and the written request of Contractor and its performance bond surety that payment be made for such materials.

- B. Contractor warrants and guarantees that upon the receipt of payment for materials and equipment, whether incorporated in the Project or not, title to such materials and equipment will pass to Owner free and clear of all liens, claims, security interests, or encumbrances. Notwithstanding this payment and passage of title, Contractor will remain responsible for all such materials and equipment until actual delivery to the project site, incorporation into the Work, and final acceptance by Owner. Contractor further warrants that no material or equipment covered by a payment request is subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or any other person or entity.

### **9.3 PAYMENT REQUEST CERTIFICATION**

- A. Architect will, within seven (7) days after receipt of Contractor's payment request, forward to Owner the payment request certified for such amount as Architect determines is properly due. If Architect certifies less than the full amount of the payment request, Architect will notify Contractor and Owner of Architect's reasons for withholding certification of the full amount requested.
- B. The certification of the payment request will constitute a representation by Architect to Owner based upon Architect's observations at the site and the data comprising the payment request, that the Work has progressed to the point indicated and that, to the best of Architect's knowledge, information, and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to minor deviations from the Contract Documents correctable prior to completion, and to specific qualifications expressed by Architect. However, the certification of the payment request will not constitute a representation that Architect has:
  1. Conducted exhaustive or continuous on-site inspections to check the quantity or quality of the Work;
  2. Reviewed construction means, methods, techniques, sequences, or procedures;
  3. Reviewed copies of requisitions received from Subcontractors or other data requested by Owner to substantiate Contractor's right to payment; or
  4. Made examination to ascertain how or for what purpose Contractor has used money previously paid on account of the Contract Sum.
- C. In taking action on Contractor's payment request, Owner will be entitled to rely on the accuracy and completeness of the information furnished by Contractor.

### **9.4 DECISIONS TO WITHHOLD CERTIFICATION AND PAYMENT**

- A. Architect may withhold certification of a payment request in whole or in part to the extent reasonably necessary to protect Owner if, in the opinion of Architect, the representations to Owner required by Section 9.3, Paragraph B cannot be accurately made. If

Architect is unable to certify payment in the amount of the payment request, Architect will notify Contractor and Owner as provided in Section 9.3, Paragraph A. If Contractor and Architect cannot agree on a revised amount, Architect will promptly certify a payment request for the amount for which Architect is able to make such representations to Owner. Architect may also decide not to certify payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a payment request previously certified, to such extent as may be necessary in Architect's opinion to protect Owner from loss because of:

1. Defective work not remedied;
  2. Third-party claims filed or reasonable evidence indicating probable filing of such claims;
  3. Failure of Contractor to make payments properly to Subcontractors for labor, materials, equipment, construction or services;
  4. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
  5. Damage to Owner or another contractor for which Contractor is responsible;
  6. Reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance will not be adequate to cover the cost of completing the Work and damages for the anticipated delay; or
  7. Contractor's persistent failure to carry out the Work in accordance with the Contract Documents.
- B. Owner reserves the right to withhold payments to Contractor, subsequent to Architect's certification of any payment request, in order to protect Owner from loss due to any condition described in Section 9.4, Paragraph A, Subparagraphs 1 through 7. Upon satisfactory resolution of any such conditions, payments so withheld will be made.

## **9.5 PROGRESS PAYMENTS**

- A. Owner will pay Contractor progress payments within the parameters of Section 9.2 within fifteen (15) days after Owner receives the certified payment request from Architect.
- B. Owner will make payments to Contractor by either placing the payments in the mail addressed to Contractor or by electronic transfer at Owner's discretion.
- C. Upon receipt of any payment from Owner, Contractor will pay to each Subcontractor the amount paid to Contractor on account of such Subcontractor's portion of the Work.
- D. Contractor will maintain a copy of each payment request at the Project site for review by the Subcontractors.
- E. No payment made under the Contract Documents, either in whole or in part, will be construed to be an acceptance of defective or improper materials or workmanship.
- F. In addition and notwithstanding the foregoing, Owner will also withhold and retain 10% of payments made to Contractor.
- G. Owner will pay any unpaid retention less any amounts withheld pursuant to Section 9.4 within forty-five (45) days after Contractor achieves Substantial Completion, submits its payment request for retained funds, delivers to the Architect Owner's form entitled "Contractor's Substantial Completion Affidavit and Consent of Surety" fully executed by Contractor and its surety, obtains Waiver and Release documents executed by all subcontractors and suppliers having claim against the retained funds, and Owner receives a certificate of occupancy.

## **9.6 FINAL PAYMENT**

- A. Owner will make full and final payment of the Contract Sum within thirty (30) days of the completion of all of the following requirements:
1. Contractor has submitted its final payment request;
  2. Architect has declared to Owner in writing that the Work is complete;
  3. Contractor has obtained waiver and release upon final payment documents executed by all of the subcontractors performing work and/or providing materials covered by the Contractor's final payment request; and
  4. Contractor has collected and provided to Owner all manufacturers' and other guaranties and warranties, properly signed and endorsed to Owner, that are required by the Contract Documents that extend for a period beyond one year after substantial completion. (Delivery of such guaranties and warranties will not relieve Contractor for any obligation assumed under any other provision of the Contract Documents.)
- B. Acceptance of final payment by Contractor or any Subcontractor will constitute a waiver of claims by the payee except for those claims previously made in writing pursuant to Section 7 and identified by Contractor in its affidavit as still pending.
- C. If the aggregate of previous payments made by Owner exceeds the amount due Contractor, Contractor will reimburse the difference to Owner.

# **SECTION 10 - PROTECTION OF PERSONS AND PROPERTY**

## **10.1 SAFETY PRECAUTIONS AND PROGRAMS**

Contractor will be responsible to Owner for initiating and supervising all safety programs in connection with the performance of the Work.

## **10.2 SAFETY OF PERSONS AND PROPERTY**

- A. Contractor will take reasonable precautions to prevent damage, injury, or loss to:

1. All persons on the site;
  2. The Work and materials and equipment to be incorporated into the Work; and
  3. Other property at the site or adjacent to it.
- B. Contractor will give notices and comply with applicable laws, ordinances, rules, regulations, and other lawful requirements of public authorities bearing on the safety or protection of persons and property. No work will be performed that may pose an undue safety hazard to Contractor, Contractor's employees, or any other person.
- C. Contractor will designate a responsible member of its organization at the site whose duty will be the prevention of accidents. This person will be Contractor's onsite representative unless otherwise designated in writing by Contractor to Owner and Architect.

### 10.3 EMERGENCIES

In case of an emergency endangering life or threatening the safety of any person or property, Contractor may, without waiting for specific authorization from Architect or Owner, act at its own discretion to safeguard persons or property. Contractor will immediately notify Architect of such emergency action and make a full written report to Architect within five (5) days after the event.

### 10.4 HAZARDOUS MATERIALS

In the event the Contractor encounters on the site material reasonably believed to be hazardous materials which have not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and Architect in writing. The Work in the affected area shall be resumed in the absence of hazardous materials, or when it has been rendered harmless, by written agreement of the Owner and Contractor.

## SECTION 11 - INSURANCE AND BONDS

### 11.1 CONTRACTOR'S LIABILITY INSURANCE

- A. Contractor will obtain the following insurance and provide evidence thereof as described below prior to commencement of the Work or within ten (10) days after signing the Agreement, whichever is earlier:
1. Workers Compensation Insurance.
  2. Employers Liability Insurance with minimum limits of the greater of \$500,000 E.L. each accident, \$500,000 E. L. disease- each employee, \$500,000 E.L. disease-policy limit or as required by the law of the state in which the Project is located.
  3. Commercial General Liability Insurance – ISO Form CG 00 01 (12/07) or equivalent Occurrence policy which will provide primary coverage to the additional insureds (the Owner and the Architect) in the event of any Occurrence, Claim, or Suit with:
    - a. Limits of the greater of Contractor's actual coverage amounts or the following:
      - 1) \$2,000,000 General Aggregate;
      - 2) \$2,000,000 Products - Comp/Ops Aggregate;
      - 3) \$1,000,000 Personal and Advertising Liability;
      - 4) \$1,000,000 Each Occurrence;
      - 5) \$50,000 Fire Damage to Rented Premises (Each Occurrence).
    - b. Endorsements attached to the General Liability policy including the following or their equivalent:
      - 1) ISO Form CG 25 03 (05/09), Amendment of Limits of Insurance (Designated Project or Premises), describing the Agreement and specifying limits as shown above.
      - 2) ISO Form CG 20 10 (07/04), Additional Insured -- Owners, Lessees, Or Contractors (Form B), naming Owner and Architect as additional insureds.
  4. Automobile Liability Insurance, with:
    - a. Combined Single Limit each accident in the amount of \$1,000,000 or Contractor's actual coverage, whichever is greater; and
    - b. Coverage applying to "Any Auto."
- B. Contractor will provide evidence of such insurance to Owner as follows:
1. Deliver to Owner a Certificate of Liability Insurance, on ACORD 25 (2010/05) Form, or equivalent:
    - a. Listing Owner and its consultants as the Certificate Holders and Additional Insured on the general liability and any excess liability policies;
    - b. Attaching the ISO or equivalent endorsements set forth above to the Certificate of Liability Insurance;
    - c. Identifying the Project;
    - d. Listing the insurance companies providing coverage (All companies listed must be rated in A.M. Best Company Key Rating Guide-Property-Casualty and each company must have a rating of B+ Class VII or better. Companies which are not rated are not acceptable); and
    - e. Bearing the name, address and telephone number of the producer and signed by an authorized representative of the producer. The signature may be original, stamped, or electronic.
- C. Contractor will maintain, from commencement of the Work, Insurance coverage required herein as follows:
1. Commercial General Liability Insurance through expiration of warranty period specified in Section 12.2, Paragraph B. including completion of any warranty repairs; and
  2. All other insurance through Final Payment.
- D. Owner reserves the right to reject any insurance company, policy, endorsement, or certificate of insurance with or without cause.

- E. Owner may, in writing and at its sole discretion, modify the insurance requirements.
- F. The cost of insurance as required above will be the obligation of Contractor. Contractor will be responsible for payment of all deductible amounts under all insurance.
- G. Owner will provide builders risk insurance for the cost of the Project. The policy will be written on an all risk basis with coverage for perils of wind, flood, earthquake, and terrorism, with exclusions standard for the insurance industry. The policy will be subject to a \$5,000 deductible per occurrence which will be the responsibility of Contractor and will not be a reimbursable expense. Owner will provide a copy of the terms and conditions of the builders risk policy to Contractor upon Contractor's request. Contractor will comply with terms, conditions, and deadlines of the builders risk policy. The terms, conditions, and deadlines of the builders risk policy shall govern coverage. In addition, when there is a loss which may be covered by the builders risk insurance policy, Contractor will comply with the following:
  1. Contractor will report the loss immediately to builders risk commercial insurer by calling 1-866-537-7475 and shall make such further written submissions as required and otherwise comply with all requirements of the builders risk policy.
  2. Contractor will report the loss immediately to the Owner.
  3. Contractor will immediately notify its general liability insurance carrier of the loss.
  4. Contractor will take all necessary and appropriate actions to protect the property and individuals from further loss, harm, and injury. In the event there are damages resulting from fire or water, restoration shall be performed only by a certified restoration contractor.
  5. To the extent possible, Contractor will preserve and not disturb the evidence of the loss until after the builders risk commercial insurer and all interested parties and their insurance carriers have had the opportunity to view and investigate the site and loss.
  6. Contractor will cooperate with Owner and the builders risk commercial insurer in the investigation, documentation, and settlement of loss claims, including without limitation promptly responding to all requests for information and documentation from the builders risk commercial insurer and/or Owner.

## **11.2 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND**

- A. Prior to commencement of the Work or within ten (10) days after signing the Agreement, whichever is earlier, Contractor will furnish to Owner a performance bond and a labor and material payment bond each in an amount equal to one hundred percent (100%) of the Contract Sum as security for all obligations arising under the Contract Documents. Such bonds will:
  1. Be written on Form AIA Document A312 (1984).
  2. Be issued by a surety company or companies licensed in the state in which the Project is located and holding valid certificates of authority under Sections 9304 to 9308, Title 31, of the United States Code as acceptable sureties or reinsurance companies on federal bonds.
  3. Have a penal sum obligation not exceeding the authorization shown in the current revision of Circular #570 as issued by the United States Treasury Department, i.e. "Treasury List".
  4. Be accompanied by a certified copy of the power of attorney stating the authority of the attorney-in-fact executing the bonds on behalf of the surety.
- B. Owner reserves the right to reject any surety company, performance bond, or labor and material payment bond with or without cause.
- C. The cost of the bonds as required above will be the obligation of Contractor.

## **SECTION 12 - UNCOVERING AND CORRECTION OF WORK**

### **12.1 UNCOVERING OF WORK**

Contractor will notify Architect at least twenty-four (24) hours in advance of performing work that would cover up work or otherwise make it difficult to perform inspections required by the Specifications or by applicable governing authorities. Should any such work be covered without proper notification having been given to Architect, Contractor will uncover that work for inspection at its own expense.

### **12.2 CORRECTION OF WORK**

- A. Contractor will promptly correct any portion of the Work that is rejected by Architect or which fails to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. Contractor will bear the cost of correcting such rejected Work, including additional testing and inspection costs, compensation for Architect's services, and any other expenses made necessary thereby.
- B. Contractor will remedy any defects due to faulty materials, equipment, or workmanship which appear within a period of one (1) year from the date of Substantial Completion or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents. Contractor will pay all costs of correcting faulty work, including without limitation additional Architect's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses when incurred.
- C. Nothing in the Contract Documents will be construed to establish a period of limitation within which Owner may enforce the obligation of Contractor to comply with the Contract Documents. The one-year period specified above has no relationship to the time within which compliance with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish Contractor's liability with respect to Contractor's obligations.

### **12.3 ACCEPTANCE OF NONCONFORMING WORK**

- A. If Owner prefers to accept any portion of the Work not in conformance with the Contract Documents, Owner may do so instead of requiring removal and correction of the nonconforming Work. In that event, the Contract Sum will be reduced by an amount agreed upon by the parties that reflects the difference in value to Owner between the Work as specified and the nonconforming Work. Such adjustment may consider increased maintenance costs, early replacement costs, increased inefficiency of use, and the like and will be effective whether or not final payment has been made. Such adjustment will be reflected in a Change Order pursuant to Section 7.5.
- B. Temporary or trial usage by Owner or Architect of mechanical devices, machinery, apparatus, equipment, or other work or materials supplied under the Contract Documents prior to written acceptance by Architect, will not constitute Owner's acceptance.

## **SECTION 13 - RESOLUTION OF DISPUTES**

### **13.1 SUBMITTAL OF DISPUTE**

In the event there is any dispute arising under this Agreement which cannot be resolved by agreement between the parties, either party may submit the dispute with all documentation upon which it relies to the Director of Architecture, Engineering, and Construction, Meetinghouse Facilities Department, 50 East North Temple, Salt Lake City, Utah 84150, who will convene a dispute resolution conference within thirty (30) days. The dispute resolution conference will constitute settlement negotiations and any settlement proposal made pursuant to the conference will not be admissible as evidence of liability. In the event that the parties do not resolve their dispute pursuant to the dispute resolution conference, either party may commence legal action to resolve the dispute. Any such action must be commenced within six (6) months from the first day of the dispute resolution conference or be time barred. Submission of the dispute to the Director as outlined above is a condition precedent to the right to commence legal action to resolve any dispute. In the event that either party commences legal action to adjudicate any dispute without first submitting the dispute to the Director, the other party will be entitled to obtain an order dismissing the litigation without prejudice and awarding such other party any costs and attorney fees incurred by that party in obtaining the dismissal, including without limitation copy costs, and expert and consultant fees and expenses.

### **13.2 CONTRACTOR TO PROCEED WITH DILIGENCE**

Pending final resolution of a dispute hereunder, Contractor will proceed diligently with the performance of its obligations under this Agreement.

## **SECTION 14 - TERMINATION**

### **14.1 TERMINATION BY CONTRACTOR**

In the event Owner materially breaches any term of the Contract Documents, Contractor will promptly give Written Notice of the breach to Owner. If Owner fails to cure the breach within ten (10) days of the Written Notice, Contractor may terminate the Agreement by giving Written Notice to Owner and recover from Owner the percentage of the Contract Sum represented by the Work completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation or damages as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations under section 3.14 as well as all warranties in the specifications relative to Work provided through the date of termination survive a termination hereunder.

### **14.2 TERMINATION BY OWNER FOR CAUSE**

Should Contractor fail to provide Owner with the bonds and certificates of insurance required by Section 11 within the time specified therein, make a general assignment for the benefit of its creditors, fail to apply enough properly skilled workmen or specified materials to properly prosecute the Work in accordance with Contractor's schedule, or otherwise materially breach any provision of the Contract Documents, then Owner may, without any prejudice to any other right or remedy, give Contractor Written Notice thereof. If Contractor fails to cure its default within ten (10) days, Owner may terminate the Agreement by giving Written Notice to Contractor. In such case, Owner may, in Owner's sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor and/or take possession of the premises and all materials, tools, equipment, and appliances thereon, and finish the Work by whatever method Owner deems expedient. Contractor will not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Sum exceeds the expense of finishing the Work, including compensation for additional administrative, architectural, consultant, and legal services (including without limitation attorney fees, expert fees, copy costs, and other expenses), such excess will be paid to Contractor. If such expense exceeds the unpaid balance, Contractor will pay the difference to Owner. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations under section 3.14 as well as all warranties in the specifications relative to Work provided through the date of termination survive a termination hereunder.

### **14.3 TERMINATION BY OWNER FOR CONVENIENCE**

Notwithstanding any other provision contained in the Contract Documents, Owner may, without cause and in its absolute discretion, terminate the Agreement at any time. In the event of such termination, Contractor will be entitled to recover from Owner the

percentage of the Contract Sum equal to the percentage of the Work which Architect determines has been completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Owner may, in Owner's sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor. Without limitation, Contractor's indemnities and obligations under section 3.14 as well as all warranties in the specifications relative to Work provided through the date of termination survive a termination hereunder.

## **SECTION 15 - MISCELLANEOUS PROVISIONS**

### **15.1 GOVERNING LAW**

The parties acknowledge that the Contract Documents have substantial connections to the State of Utah. The Contract Documents will be deemed to have been made, executed, and delivered in Salt Lake City, Utah. To the maximum extent permitted by law, (i) the Contract Documents and all matters related to their creation and performance will be governed by and enforced in accordance with the laws of the State of Utah, excluding conflicts of law rules; and (ii) all disputes arising from or related to the Contract Documents will be decided only in a state or federal court located in Salt Lake City, Utah and not in any other court or state. Toward that end, the parties hereby consent to the jurisdiction of the state and federal courts located in Salt Lake City, Utah and waive any other venue to which they might be entitled by virtue of domicile, habitual residence, place of business, or otherwise.

### **15.2 NO WAIVER**

No action or failure to act by Owner, Architect, or Contractor will constitute a waiver of a right or duty afforded them under the Contract Documents, nor will such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

### **15.3 RULE OF CONSTRUCTION**

Owner and Contractor agree that the Contract Documents will be deemed to have been drafted by both Owner and Contractor and will not be construed against either Owner or Contractor because of authorship.

### **15.4 ENFORCEMENT**

In the event either party commences legal action to enforce or rescind any provision of the Contract Documents, the prevailing party will be entitled to recover its attorney fees and costs, including without limitation all copy costs and expert and consultant fees and expenses, incurred in that action and on all appeals, from the other party.

### **15.5 TESTS AND INSPECTIONS**

- A. Owner and Architect have the right to have tests made when they deem it necessary. Tests conducted by Owner or Architect will be paid for by Owner. Should a test reveal a failure of the Work to meet Contract Document requirements, the cost of the test as well as subsequent tests related to the failure necessary to determine compliance with the Contract Documents will be paid for by Owner, with the cost thereof deducted from the Contract Sum by Modification.
- B. Tests will be made in accordance with recognized standards by a competent, independent testing laboratory. Materials found defective or not in conformity with Contract Document requirements will be promptly replaced or repaired at the expense of Contractor.
- C. Owner and Architect have the right to obtain samples of materials to be used in the Work and to test samples for determining whether they meet Contract Document requirements. Samples required for testing will be furnished by Contractor and selected as directed by Architect. Samples may be required from the sample's source, point of manufacture, point of delivery, or point of installation at Architect's discretion. Samples not required as a Submittal in the Specifications will be paid for by Owner. Should tests reveal a failure of the Sample to meet the Contract Document requirements, Contractor will provide other Samples that comply with the requirements of the Contract Documents.

END OF DOCUMENT

# AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR A FIXED SUM (U.S.)

The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole ("Owner") and \_\_\_\_\_ ("Contractor") hereby enter into this *Agreement Between Owner and Contractor for a Fixed Sum (U.S.)* ("Agreement") and agree as follows:

1. **Property/Project.**

Property/Project Number:  
Property Address ("Project Site"):

Project Type:  
Project Name ("Project"):

Stake Name:

2. **Scope of the Work.** Contractor will furnish all labor, materials, equipment, construction, and services necessary to complete the Work in accordance with the Contract Documents.

3. **Contract Documents.**

- a. The Contract Documents consist of:
  - 1) This Agreement;
  - 2) The General Conditions for a Fixed Sum (U.S.), the Supplementary Conditions for a Fixed Sum (U.S.), and the Specifications (Divisions 01 through 49) contained in the Project Manual entitled \_\_\_\_\_, dated \_\_\_\_\_ and prepared by \_\_\_\_\_ ("Architect");
  - 3) The Drawings prepared by Architect entitled \_\_\_\_\_, sheet numbers \_\_\_\_\_, dated \_\_\_\_\_;
  - 4) Addendum No. \_\_\_\_\_ dated \_\_\_\_\_; and
  - 5) All Modifications to the Contract Documents.
- b. The Contract Documents are incorporated into this Agreement by reference as if fully set forth herein.
- c. The definitions set forth in the General Conditions for a Fixed Sum (U.S.) will apply to the Contract Documents.
- d. The Contract Documents contain the entire and integrated agreement between the parties hereto and supersede all prior negotiations, representations, or agreements, either written or oral.
- e. Modifications or other amendments to the Contract Documents must be in writing and as provided in the General Conditions for a Fixed Sum (U.S.).

4. **Time of Commencement and Substantial Completion.**

- a. Contractor will commence the Work on the date for commencement set forth in the Written Notice to proceed from Owner to Contractor.
- b. Contractor will achieve Substantial Completion and have the Work ready for Owner's inspection no later than \_\_\_\_\_ (\_\_\_\_\_) days from the date of commencement set forth in the Written Notice to proceed from Owner to Contractor, as adjusted in accordance with the Contract Documents.
- c. Time is of the essence.

5. **Contract Sum.**

- a. Owner will pay Contractor for performance of Contractor's obligations under the Contract Documents the Contract Sum in the amount of \_\_\_\_\_ Dollars (\$\_\_\_\_\_), subject to additions and deductions as provided in the Contract Documents.
- b. Owner will make payments to Contractor in accordance with the Contract Documents.

6. **Independent Contractor Relationship.** Contractor is an independent contractor and is not the agent or employee of Owner.

7. **Assignment.** Neither party to this Agreement will assign any right or obligation hereunder without the prior written consent of the other, which consent may be granted or withheld in such party's absolute discretion.

Contractor will not assign moneys due or to become due to Contractor hereunder, nor will Contractor pledge the credit of Owner or bind Owner to any third party.

- 8. **Notice.** The parties designate the addresses, facsimile numbers, and email addresses as set forth in the signature blocks below to be used for sending Written Notice to the other party:
- 9. **Effective Date.** The effective date of this Agreement is the date indicated by the Owner's signature.

**OWNER:**

The Church of Jesus Christ of Latter-day Saints,  
a Utah corporation sole

Signature:

Print Name:

Title:

Address:

Telephone No:

Facsimile No:

Email:

Effective Date:

Reviewed By:

**CONTRACTOR:**

(company)

Signature:

Print Name:

Title:

Address:

Telephone No:

Facsimile No:

Email:

Fed. I.D. or SSN:

License No:

Date Signed:

Sample Form of Agreement

# **SUPPLEMENTARY CONDITIONS**

## **FOR SMALL PROJECT AGREEMENT BETWEEN OWNER AND CONTRACTOR (U.S.)**

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### **ITEM 1 - GENERAL**

1. Conditions of the Small Project Agreement Between Owner and Contractor (U.S.) apply to each Division of the Specifications.
2. Provisions contained in Division 01 apply to all Divisions of the Specifications.

### **ITEM 2 - LIQUIDATED DAMAGES PAYABLE TO OWNER**

*This section may be included as a separate additional paragraph to the Small Project Agreement Between Owner and Contractor (U.S.), at Owner's discretion:*

**Delay in Completion of the Work.** For each day after the expiration of the designated Time of Completion that Contractor has not completed the Work, Contractor will pay Owner the amount of one hundred and fifty dollars (\$100.00) per day as liquidated damages for Owner's loss of use and the added administrative expense to Owner to administer the Project during the period of delay. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorneys' fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay. Owner may deduct any liquidated damages or reimbursable expenses from any money due or to become due to Contractor. If the amount of liquidated damages and reimbursable expenses exceeds any amounts due to Contractor, Contractor will pay the difference to Owner within ten (10) days after receipt of a written request from Owner for payment.

### **ITEM 3 - STATE SPECIFIC SUPPLEMENTARY CONDITIONS**

#### **Colorado**

#### **COLORADO STATE SALES TAX:**

*Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):*

1. Contractor will make an application to State Department of Revenue for certificate of exemption to permit purchase of building materials for construction of this Project without payment of Sales Tax. Applications and certificates will be on forms provided by the Department of Revenue.
2. Prior to start of construction, Contractor will furnish to the Owner copies of the applications submitted and certificates obtained. Upon receipt of the certificate Contractor shall make a copy for each subcontractor involved in the Project and complete it by filling in the subcontractor's name and address and signing it. The original certificate and copies of all certificates that the Contractor issues to subcontractors should be kept at the Contractor's place of business for a minimum of three years.
3. The Owner's sales tax exemption number for the State of Colorado is 98-01587.

END OF DOCUMENT

## **DIVISION 01: GENERAL REQUIREMENTS**

### **01 1000 SUMMARY**

- 01 1100 SUMMARY OF WORK & BID ALTERNATES
- 01 1400 WORK RESTRICTIONS

### **01 2000 PRICE AND PAYMENT PROCEDURES**

- 01 2900 PAYMENT PROCEDURES

### **01 3000 ADMINISTRATIVE REQUIREMENTS**

- 01 3100 PROJECT MANAGEMENT AND COORDINATION
- 01 3300 SUBMITTAL PROCEDURES

### **01 4000 QUALITY REQUIREMENTS**

- 01 4100 REGULATORY REQUIREMENTS
- 01 4301 QUALITY ASSURANCE - QUALIFICATIONS

### **01 6000 PRODUCT REQUIREMENTS**

- 01 6100 COMMON PRODUCT REQUIREMENTS
- 01 6200 PRODUCT OPTIONS
- 01 6600 PRODUCT DELIVERY, STORAGE, AND HANDLING REQUIREMENTS

### **01 7000 EXECUTION AND CLOSEOUT REQUIREMENTS**

- 01 7300 EXECUTION
- 01 7400 CLEANING AND WASTE MANAGEMENT
- 01 7700 CLOSEOUT PROCEDURES
- 01 7800 CLOSEOUT SUBMITTALS

END OF TABLE OF CONTENTS

**SECTION 01 1100****SUMMARY OF WORK & BID ALTERNATES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
1. Administrative and procedural requirements Summary of Work requirements.

**1.2 WORK COVERED BY CONTRACT DOCUMENTS**

- A. Provisions contained in Division 01 apply to Sections of Divisions 02 through 26 of Specifications. Instructions contained in Specifications are directed to Contractor. Unless specifically provided otherwise, obligations set forth in Contract Documents are obligations of Contractor.
- B. Contractor shall furnish total labor, materials, equipment, and services necessary to perform The Work in accordance with Contract Document..

**1.3 SCOPE**

- A. Bidder hereby proposes to furnish all materials, labor, equipment, tools, transportations, services, licenses, fees, permits, etc., required by said documents to complete the Work described by the Contract Documents to replace HVAC systems to rooms as shown and all related work.
1. LDS Murray meetinghouse mechanical equipment was vandalized including seven (7) exterior condensing units. The six (6) associated gas-fired furnaces and two (2) air handling units have exceeded their useful life expectancy. It is proposed that the existing condensing units, furnaces, air handling units, DX coils and controls be replaced. The air handling units will be replaced with four (4) gas-fired furnaces each. The existing distribution ductwork will remain. The controls will be upgraded to LCBS. The plumbing scope includes gas and condensate piping to furnaces. The electrical scope includes power to the furnaces and condensing units.
  2. There will be two bid allowances to be included in each bid. The bid price for these items will be provided by addendum.
    - a. All Furnaces, Cooling Coils and condensing units have been pre-ordered by the owner, but will be paid for, received, and installed by the contractor.
    - b. All Concrete work, fencing, patching and repairing of walls and ceilings will be preformed by a local general contractor.

Contractor shall include the allowance for this work in their bid. Contractor can include standard mark-ups to cover warranty, and OH&P.

**PART 2 - PRODUCTS Not Used****PART 3 - EXECUTION Not Used****END OF SECTION**

**SECTION 01 1400****WORK RESTRICTIONS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
1. Administrative and procedural requirements for Work Restrictions.

**1.2 PROJECT CONDITIONS**

- A. During construction period, Contractor will have use of premises for construction operations. Contractor will ensure that Contractor, its employees, subcontractors, and their employees comply with following requirements:
1. Confine operations to areas within Contract limits shown on Drawings. Do not disturb portions of site beyond Contract limits.
  2. Do not allow alcoholic beverages, illegal drugs, or persons under their influence on Project site.
  3. Do not allow use of tobacco in any form on Project Site.
  4. Do not allow pornographic or other indecent materials on site.
  5. Do not allow work on Project site on Sundays except for emergency work.
  6. Refrain from using profanity or being discourteous or uncivil to others on Project Site or while performing The Work.
  7. Wear shirts with sleeves, wear shoes, and refrain from wearing immodest, offensive, or obnoxious clothing, while on Project Site.
  8. Do not allow playing of obnoxious and loud music on Project Site. Do not allow playing of any music within existing facilities.
  9. Do not build fires on Project Site.
  10. Do not allow weapons on Project Site, except those carried by law enforcement officers or other uniformed security personnel who have been retained by Owner or Contractor to provide security services.
- B. Do not load or permit any part of the structure to be loaded with a weight that will endanger its safety. Questions of structural loading as part of construction means and methods shall be addressed by a licensed structural engineer engaged by Contractor, subject to the review by Architect.

**PART 2 - PRODUCTS Not Used****PART 3 - EXECUTION Not Used****END OF SECTION**

**SECTION 01 2900****PAYMENT PROCEDURES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements to prepare and process Applications for Payments.

**1.2 PAYMENT REQUESTS**

- A. Use Payment Request forms provided by Owner.
- B. Each Payment Request will be consistent with previous requests and payments certified by Architect and paid for by Owner.
- C. Request Preparation:
  - 1. Complete every entry on Payment Request form.
  - 2. Entries will match data on approved schedule of values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
  - 3. Submit signed Payment Request to Architect with current Construction Schedule.
- D. Provide following submittals before or with submittal of Initial Payment Request:
  - 1. List of Subcontractors.
  - 2. Initial progress report.
  - 3. Contractor's Construction Schedule.
  - 4. Submittal Schedule.
- E. Provide Affidavit of Contractor and Consent of Surety with Payment Request following Substantial Completion.

**1.3 SCHEDULE OF VALUES**

- A. Submit schedule of values on Owner's standard form to Architect 20 days minimum before submission of Initial Payment Request as a necessary condition before payment will be processed. Coordinate preparation of schedule of values with preparation of Contractor's Construction Schedule. Correlate line items in Schedule of Values with other required administrative schedules and forms, including:
  - 1. Contractor's Construction Schedule.
  - 2. Payment Request form.
  - 3. Schedule of Allowances.
  - 4. Schedule of Alternates.
- B. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of Contract Sum.
  - 1. Include separate line items under Contractor and principal subcontracts for Sustainable (LEED) documentation and other project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.

**PART 2 - PRODUCTS Not Used****PART 3 - EXECUTION Not Used****END OF SECTION**

**SECTION 01 3100****PROJECT MANAGEMENT AND COORDINATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Project Management and Coordination on Projects.

**1.2 PROJECT COORDINATION**

- A. This Project designation will be included on documents generated for Project by Contractor and Subcontractors, or be present on a cover letter accompanying such documents.

**1.3 MULTIPLE CONTRACT COORDINATION**

- A. Contractor shall be responsible for accurately maintaining and reporting schedule of The Work from Notice to Proceed to date of Substantial Completion.
- B. Contractor shall be responsible for providing Temporary Facilities And Controls for those who perform work on Project from Notice to Proceed to date of Substantial Completion.
- C. Contractor shall be responsible for providing Construction Waste Management And Disposal services for those who perform work on Project from Notice to Proceed to date of Substantial Completion.
- D. Contractor shall be responsible for Final Cleaning for entire Project.

**1.4 PROJECT MEETINGS AND CONFERENCES**

- A. Preconstruction Conference:
  - 1. Attend preconstruction conference and organizational meeting scheduled by Architect at Project site or other convenient location.
  - 2. Be prepared to discuss items of significance that could affect progress, including such topics as:
    - a. Construction schedule.
    - b. Critical Work sequencing.
    - c. Current problems.
    - d. Designation of responsible personnel.
    - e. Distribution of Contract Documents.
    - f. Equipment deliveries and priorities.
    - g. General schedule of inspections by Architect and its consultants.
    - h. General inspection of tests.
    - i. Office, work, and storage areas.
    - j. Preparation of record documents and O & M manuals.
    - k. Procedures for processing interpretations and Modifications.
    - l. Procedures for processing Payment Requests.
    - m. Project cleanup.
    - n. Security.
    - o. Status of permits.

- p. Submittal of Product Data, Shop Drawings, Samples, Quality Assurance / Control submittals.
  - q. Sustainable (LEED) Requirements.
  - r. Use of the premises.
  - s. Work restrictions.
  - t. Working hours.
3. Architect will record minutes of meetings and distribute copies to Owner and Contractor within three (3) working days.
- B. Progress Meetings:
1. Attend progress meetings at Project site at regularly scheduled intervals determined by Architect, at least once a month.
  2. Progress meetings will be open to Owner, Architect, Subcontractors, and anyone invited by Owner, Architect, and Contractor.
  3. Be prepared to discuss items of significance that could affect progress, including following:
    - a. Progress since last meeting.
    - b. Whether Contractor is on schedule.
    - c. Activities required to complete Project within Contract Time.
    - d. Labor and materials provided under separate contracts.
    - e. Off-site fabrication problems.
    - f. Access.
    - g. Site use.
    - h. Temporary facilities and services.
    - i. Hours of work.
    - j. Hazards and risks.
    - k. Project cleanup.
    - l. Quality and Work standards.
    - m. Status of pending modifications.
    - n. Documentation of information for Payment Requests.
    - o. Maintenance of Project records.
  4. Architect will prepare minutes of progress meetings and distribute copies of minutes to Owner and Contractor within three (3) working days.
- C. Pre-Installation Conferences:
1. Attend pre-installation conferences specified in Contract Document.
    - a. If possible, schedule these conferences on same day as regularly scheduled Progress Meetings. If this is not possible, coordinate scheduling with Architect.
    - b. Request input from attendees in preparing agenda.
  2. Be prepared to discuss following items:
    - a. Requirements of Contract Documents.
    - b. Completed work necessary for installation of items or systems.
    - c. Conditions not in compliance with installation requirements.
    - d. Installation and inspection schedule.
    - e. Coordination between trades.
    - f. Space and access limitations.
    - g. Testing.
  3. Architect will prepare meeting minutes and distribute minutes to Owner and Contractor within three (3) working days.

**PART 2 - PRODUCTS Not Used****PART 3 - EXECUTION Not Used****END OF SECTION**

**SECTION 01 3300****SUBMITTAL PROCEDURES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
1. Administrative and procedural requirements for Submittal Procedures.

**1.2 SUBMITTAL SCHEDULE**

- A. Furnish submittal schedule within 20 days after receipt of Notice to Proceed, listing items specified to be furnished for review to Architect including product data, shop drawings, samples, and Informational submittals.
1. Coordinate submittal schedule with Contractor's construction schedule.
  2. Enclose the following information for each item:
    - a. Scheduled date for first submittal.
    - b. Related Section number.
    - c. Submittal category.
    - d. Name of Subcontractor.
    - e. Description of part of the Work covered.
    - f. Scheduled date for resubmittal.
    - g. Scheduled date for Architect's final release or approval.
- B. Print and distribute copies to Architect and Owner and post copy in field office. When revisions are made, distribute to same parties and post in same location.
- C. Revise schedule monthly. Send copy of revised schedule to Owner and Architect and post copy in field office.

**1.3 SUBMITTAL PROCEDURES**

- A. Coordination:
1. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently before performance of related construction activities to avoid delay.
    - a. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
    - b. Coordinate transmittal of different types of submittals required for related elements of The Work so processing will not be delayed by need to review submittals concurrently for coordination. Architect reserves right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
  2. Processing Time:
    - a. Allow sufficient review time so installation will not be delayed by time required to process submittals, including time for resubmittals.
      - 1) Allow 21 days for initial review. Allow additional time if processing must be delayed to allow coordination with subsequent submittals. Architect will promptly advise Contractor when submittal being processed must be delayed for coordination.
      - 2) If an intermediate submittal is necessary, process same as initial submittal.
      - 3) Allow 10 days for reprocessing each submittal.

- 4) No extension of Contract Time will be authorized because of failure to transmit submittals to Architect in sufficient time before work is to be performed to allow processing.
3. Identification:
  - a. Place permanent label or title block on each submittal for identification. Include name of entity that prepared each submittal on label or title block.
    - 1) Provide space approximately 4 by 5 inches on label or beside title block on Shop Drawings to record Contractor's review and approval markings and action taken.
    - 2) Include following information on label for processing and recording action taken:
      - a) Project name.
      - b) Date.
      - c) Name and address of Architect.
      - d) Name and address of Contractor.
      - e) Name and address of Subcontractor.
      - f) Name and address of supplier.
      - g) Name of manufacturer.
      - h) Number and title of appropriate Specification Section.
      - i) Drawing number and detail references, as appropriate.
4. Transmittal:
  - a. Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using transmittal letter. On transmittal, record relevant information and requests for data. Include Contractor's certification that information complies with Contract Document requirements, or, on form or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations.
  - b. Submittals received from sources other than Contractor or not marked with Contractor's approval will be returned without action.

#### 1.4 ACTION SUBMITTALS

- A. Product Data:
  1. Submit Product Data, as required by individual Sections of Specifications.
  2. Mark each copy of each set of submittals to show choices and options used on Project. Where printed Product Data includes information on products that are not required for Project, mark copies to indicate information relating to Project.
  3. Certify that proposed product complies with requirements of Contract Documents. List any deviations from those requirements on form or separate sheet.
  4. Submit five copies of each required submittal unless otherwise required. Architect will return three copies marked with action taken and with corrections or modifications required.
  5. Submit electronic files PDF: Architect will return a PDF copy marked with action taken and with corrections or modifications required.
- B. Shop Drawings:
  1. Submit newly prepared graphic data to accurate scale. Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least **8-1/2 by 11 inches (215 by 280 mm)** but no larger than **36 by 48 inches (915 by 1 200 mm)**. Highlight, encircle, or otherwise show deviations from Contract Documents. Include following information as a minimum:
    - a. Dimensions.
    - b. Identification of products and materials included.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
  2. Do not reproduce Contract Documents or copy standard information as basis of Shop Drawings. Standard printed information prepared without specific reference to Project is not acceptable as Shop Drawings.

3. Review and designate (stamp) approval of shop drawings. Unless otherwise specified, submit to Architect six copies of shop drawings required by Contract Documents. Shop drawings not required by Contract Documents, but requested by Contractor or supplied by Subcontractor, need not be submitted to Architect for review.
- C. Samples:
1. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
    - a. Mount, display, or package Samples so as to ease review of qualities specified. Prepare Samples to match samples provided by Architect, if applicable. Include following:
      - 1) Generic description of Sample.
      - 2) Sample source.
      - 3) Product name or name of manufacturer.
      - 4) Compliance with recognized standards.
      - 5) Availability and delivery time.
  2. Submit Samples for review of kind, color, pattern, and texture, for final check of these characteristics with other elements, and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
    - a. Where variations in color, pattern, texture or other characteristics are inherent in material or product represented, submit set of three samples minimum that show approximate limits of variations.
    - b. Refer to other specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
    - c. Refer to other Sections for Samples to be returned to Contractor for incorporation into The Work. Such Samples shall be undamaged at time of use. On transmittal, indicate special requests regarding disposition of Sample submittals.
  3. Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit full set of choices for material or product. Preliminary submittals will be reviewed and returned with Architect's mark indicating selection and other action.
  4. Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit three sets. One will be returned marked with action taken.
  5. Samples, as accepted and returned by Architect, will be used for quality comparisons throughout course of construction.
    - a. Unless noncompliance with Contract Documents is observed, submittal may serve as final submittal.
    - b. Sample sets may be used to obtain final acceptance of construction associated with each set.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Informational submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports, and other documentary data affirming quality of products and installations. Submit five copies of each required submittal unless otherwise required. Architect will return three copies marked with action taken and with corrections or modifications required. [or] Submit electronic files: PDF. Architect will return a PDF copy marked with action taken and with corrections or modifications required.
1. Certificates: Describe certificates intended to document affirmations by Contractor or others that the work is in accordance with the Contract Documents, but do not repeat provisions of Parts 2 or 3.
  2. Delegated Design Submittals / Design Data: Describe submittals intended to demonstrate design work prepared by Contractor's licensed professionals.

3. Test And Evaluation Reports: Describe submittal of test reports or evaluation service reports intended to document required tests.
4. Manufacturer Instructions: Describe submittals intended to document manufacturer instructions.
5. Source Quality Control Submittals: Describe submittal of source quality control documentation.
6. Field Quality Control Submittals: Describe submittal of field quality control documentation.
7. Manufacturer Reports: Describe submittal of Manufacturer reports as documentation of manufacturer activities.
8. Special Procedure Submittals: Describe submittals intended to document special procedures. An example would be construction staging or phasing for remodeling an existing facility while keeping it in operation. While the Contractor would normally be responsible for managing this, submittal of his plan as documentation could be specified.
9. Qualification Statements: Describe submittals intended to document qualifications of entities employed by Contractor.

## 1.6 CLOSEOUT SUBMITTALS

- A. This title groups submittals that occur during project closeout. Coordinate with section 01 7800 Closeout Submittals.
  1. Maintenance Contracts: Describe submittal of the maintenance contract.
  2. Operations & Maintenance Data: Describe submittal of operation and maintenance data necessary for products of the Section.
  3. Warranty Documentation: Describe submittal of final executed warranty document.
  4. Record Documentation: Describe submittal of record documentation specific to this Section.
  5. Software: Describe submittal of extra copy operating system and other utility software necessary to operate and maintain software during life of product.

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. This title groups maintenance material submittals required by Section.
  1. Spare Parts: Describe spare parts necessary for Owner's use in facility operation and maintenance. 'Parts' are generally understood to be items such as filters, motor drive belts, lamps, and other similar manufactured items that require only simple replacement.
  2. Extra Stock Materials: Describe extra stock materials to be provided for Owner's use in facility operation and maintenance.
  3. Tools and Software:
    - a. Describe tools to be provided for Owner's use in facility operation and maintenance. Tools are generally understood to be wrenches, gauges, circuit setters, etc, required for proper operation or maintenance of a system.
    - b. If necessary, describe submittal of an extra copy of operating system and other utility software necessary to operate and maintain the software during expected life of product.

## PART 2 - PRODUCTS Not Used

## PART 3 - EXECUTION Not Used

**END OF SECTION**

**SECTION 01 4100**  
**REGULATORY REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
1. Administrative and procedural requirements for Regulatory Requirements.

**1.2 ASBESTOS**

- A. Contract Documents for this Project have been prepared in accordance with generally accepted professional architectural and engineering practices. Accordingly, no asbestos or products containing asbestos have been knowingly specified for this Project. Notify Architect immediately for instructions if materials containing asbestos are brought to site for inclusion in the Work.
- B. At Architect's direction and with Owner's approval, a certified asbestos inspector will collect samples and an independent testing laboratory will perform testing procedures on suspect materials.
- C. Certify that based upon best knowledge, information, inspection, and belief no building materials containing asbestos were used in construction of Project. Submit certification on form provided by Owner.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

**SECTION 01 6600****PRODUCT DELIVERY, STORAGE, AND HANDLING REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Product Delivery, Storage, and Handling Requirements.

**1.2 GENERAL**

- A. Deliver, store, and handle products according to manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

**1.3 DELIVERY AND ACCEPTANCE REQUIREMENTS**

- A. Schedule delivery to reduce long-term storage at site and to prevent overcrowding of construction spaces.
- B. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
- C. Deliver products to site in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- D. Inspect products upon delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.

**1.4 STORAGE AND HANDLING REQUIREMENTS**

- A. Store products at site in manner that will simplify inspection and measurement of quantity or counting of units.
- B. Store heavy materials away from Project structure so supporting construction will not be endangered.
- C. Store products subject to damage by elements above ground, under cover in weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

**PART 2 - PRODUCTS Not Used****PART 3 - EXECUTION Not Used****END OF SECTION**

**SECTION 01 7300****EXECUTION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
1. Administrative and procedural requirements for governing Execution of the Work.

**1.2 COMMON INSTALLATION PROVISIONS**

- A. Manufacturer's Instructions: Comply with Manufacturer's installation instructions and recommendations to extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents. Notify Architect of conflicts between Manufacturer's installation instructions and Contract Document requirements.
- B. Provide attachment and connection devices and methods necessary for securing Work. Secure work true to line and level. Anchor each product securely in place, accurately located, and aligned with other Work. Allow for expansion and building movement.
- C. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain best visual effect. Refer questionable choices to Architect for final decision.
- D. Install each component during weather conditions and Project status that will ensure best possible results. Isolate each part of completed construction from incompatible material as necessary to prevent deterioration.
- E. Coordinate temporary enclosures with required inspections and tests, to reduce necessity of uncovering completed construction for that purpose.
- F. Mounting Heights: Where mounting heights are not shown, install individual components at standard mounting heights recognized within the industry or local codes for that application. Refer questionable mounting height decisions to Architect for final decision.

**PART 2 - PRODUCTS Not Used****PART 3 - EXECUTION Not Used****END OF SECTION**

**SECTION 01 7400****CLEANING AND WASTE MANAGEMENT****PART 1 – GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Administrative and procedural requirements for Cleaning and Waste Management as described in Contract Documents.
  - 2. Administrative and procedural requirements for Cleaning, Salvaging, Recycling and Disposing of Construction Waste as described in Contract Documents.
  
- B. Related Requirements:
  - 1. Section 01 1200: Coordination of responsibilities for waste management.
  - 2. Section 01 6400: Waste removal of Owner furnished products.
  - 3. In addition to standards described in this section, comply with all requirements for cleaning-up as described in various other Sections of these Specifications.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Asphalt Pavement, Brick, and Concrete (ABC) Rubble: Rubble that contains only weathered (cured) asphalt pavement, clay bricks and attached mortar normally used in construction, or concrete that may contain rebar. The rubble shall not be mixed with, or contaminated by, another waster or debris.
  - 2. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
  - 3. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
  - 4. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
  - 5. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
  - 6. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
  - 7. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.
  
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM E1609-01, 'Standard Guide for Development and Implementation of a Pollution Prevention Program.'

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conference:
  - 1. Waste Management Conference:
    - a. Schedule conference before start of construction activities on Project.
    - b. In addition to agenda items specified in Section 01 3100, review following:

- c. Review methods and procedures related to waste management including, but not limited to, the following:
  - 1) Review and discuss waste management plan including responsibilities of waste management coordinator.
  - 2) Review requirements for documenting quantities of each type of waste and its disposition.
  - 3) Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
  - 4) Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
  - 5) Review waste management requirements for each trade.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General:
  1. Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total nonhazardous solid waste generated by the Work.
  2. Practice efficient waste management in the use of materials in the course of the Work.
  3. Use all reasonable means to divert construction and demolition waste from landfills and incinerators.
  4. Facilitate recycling and salvage of materials, including the following:
    - a. Construction Waste:
      - 1) Carpet and pad.
      - 2) Electrical conduit.
      - 3) Gypsum board.
      - 4) Insulation.
      - 5) Lumber.
      - 6) Masonry and CMU.
      - 7) Metals.
      - 8) Packaging: Regardless of salvage/recycle goal indicated in paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
        - a) Boxes.
        - b) Cardboard.
        - c) Paper.
        - d) Plastic pails.
        - e) Plastic sheet and film.
        - f) Polystyrene packaging.
        - g) Wood crates.
    - 9) Piping.
    - 10) Roofing.
    - 11) Site-clearing waste.
    - 12) Wood sheet materials.
    - 13) Wood trim.

#### 1.5 SUBMITTALS

- A. Action Submittals:
  1. Waste Reduction Progress Reports:
    - a. Submit plan within 10 days of date established for the Notice to Proceed.
- B. Informational Submittals:
  1. Waste Management Progress Reports:
    - a. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
      - 1) Material category.

- 2) Generation point of waste.
  - 3) Total quantity of waste in **tons (tonnes)**.
  - 4) Quantity of waste salvaged, both estimated and actual in **tons (tonnes)**.
  - 5) Quantity of waste recycled, both estimated and actual in **tons (tonnes)**.
  - 6) Total quantity of waste recovered (salvaged plus recycled) in **tons (tonnes)**.
  - 7) Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- b. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
  - c. Records of Donations:
    - 1) Indicate receipt and acceptance of salvageable waste donated to individuals and organizations.
    - 2) Indicate whether organization is tax exempt.
  - d. Records of Sales:
    - 1) Indicate receipt and acceptance of salvageable waste sold to individuals and organizations.
    - 2) Indicate whether organization is tax exempt.
  - e. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
  - f. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
2. Sustainable Design Submittals:
    - a. Sustainable (LEED) letter template for Credit MR 2.1 and 2.2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
  3. Qualification Statements: Waste management coordinator qualification documentation.

## 1.6 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  1. Comply with hauling and disposal regulations of authorities having jurisdiction (AHJ).
- B. Qualifications:
  1. Waste Management Coordinator Qualifications:
    - a. Experienced firm, with a record of successful sustainable waste management coordination of Projects with similar requirements.

## 1.7 WASTE MANAGEMENT PLAN

- A. General:
  1. Develop a waste management plan according to ASTM E1609 and requirements of this Section.
  2. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis.
  3. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification:
  1. Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the Work.
  2. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan:

1. List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
  - a. Disposed Materials:
    - 1) Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
  - b. Handling and Transportation Procedures:
    - 1) Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.
  - c. Recycled Materials:
    - 1) Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
  - d. Salvaged Materials for Donation:
    - 1) For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
  - e. Salvaged Materials for Reuse:
    - 1) For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
  - f. Salvaged Materials for Sale:
    - 1) For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
2. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
  - a. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
  - b. Handling and transportation costs. Include cost of collection containers for each type of waste.
  - c. Net additional cost or net savings from waste management plan.
  - d. Revenue from salvaged materials.
  - e. Revenue from recycled materials.
  - f. Savings in hauling and tipping fees by donating materials.
  - g. Savings in hauling and tipping fees that are avoided.
  - h. Total cost of disposal (with no waste management).
  - i. Total quantity of waste.

## **PART 2 - PRODUCTS Not Used**

## **PART 3 - EXECUTION**

### **3.1 PLAN IMPLEMENTATION:**

- A. General:
  1. Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract:
    - a. Comply with Division 01 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.
- B. Training:
  1. Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site:

- a. Distribute waste management plan to everyone concerned within five (5) days of submittal return.
  - b. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls:
- 1. Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities:
    - a. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
    - b. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

### 3.2 RECYCLING CONSTRUCTION WASTE

- A. General:
- 1. Recycle paper and beverage containers used by on-site workers.
  - 2. Recycling Receivers and Processors: Contractor to determine suitability and merit based on project requirements.
  - 3. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
  - 4. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
  - 5. Procedures:
    - a. Contractor in coordination with the Architect to determine the option that best suits the project:
      - 1) Option 1 - Source Separated:
        - a) Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
        - b) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
        - c) Inspect containers and bins for contamination and remove contaminated materials if found.
        - d) Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
        - e) Stockpile materials away from construction area. Do not store within drip line of remaining trees.
        - f) Store components off the ground and protect from the weather.
        - g) Remove recyclable waste off Owner's property and transport to recycling receiver or processor.
      - 2) Option 2 – Co-mingled:
        - a) All recyclable waste shall be placed in a container un-separated and then separated later at the recycling facility.
- B. Packaging:
- 1. Cardboard and Boxes:
    - a. Break down packaging into flat sheets.
    - b. Bundle and store in a dry location.
  - 2. Polystyrene Packaging: Separate and bag materials.
  - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site.
    - a. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.

4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- C. Site-Clearing Wastes:
  1. Chip brush, branches, and trees at landfill facility.
- D. Gypsum Board:
  1. Stack large clean pieces on wood pallets or in container and store in a dry location.

### 3.3 DISPOSAL OF WASTE

- A. General:
  1. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
    - a. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
    - b. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning:
  1. Do not burn waste materials.
- C. Disposal:
  1. Transport waste materials off Owner's property and legally dispose of them.
- D. Landfill Receipts:
  1. Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

### 3.4 PROGRESS CLEANING

- A. Comply with regulations of authorities having jurisdiction and safety standards for cleaning.
- B. Keep premises broom clean during progress of the Work.
- C. Keep site and adjoining streets reasonably clean. If necessary, sprinkle rubbish and debris with water to suppress dust.
- D. During handling and installation, protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from soiling, damage, or deterioration until Substantial Completion.
- E. Clean and maintain completed construction as frequently as necessary throughout construction period. Adjust and lubricate operable components to ensure ability to operate without damaging effects.
- F. Supervise construction activities to ensure that no part of construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.
- G. Before and during application of painting materials, clear area where such work is in progress of debris, rubbish, and building materials that may cause dust. Sweep floors and vacuum as required and take all possible steps to keep area dust free.
- H. Clean exposed surfaces and protect as necessary to avoid damage and deterioration.

- I. Place extra materials of value remaining after completion of associated work have become Owner's property as directed by Owner or Architect.
- J. Construction Waste Management And Disposal:
  - 1. Remove waste materials and rubbish caused by employees, Subcontractors, and contractors under separate contract with Owner and dispose of legally. Remove unsuitable or damaged materials and debris from building and from property.
    - a. Provide adequate waste receptacles and dispose of materials when full.
    - b. Properly store volatile waste and remove daily.
    - c. Do not deposit waste into storm drains, sanitary sewers, streams, or waterways. Do not discharge volatile, harmful, or dangerous materials into drainage systems.
  - 2. Do not burn waste materials or build fires on site. Do not bury debris or excess materials on Owner's property.

### 3.5 FINAL CLEANING

- A. Immediately before Substantial Completion, thoroughly clean building and area where The Work was performed. Remove all rubbish from under and about building, landscaped areas and parking lot and leave building and Project Site ready for occupancy by Owner.
- B. Comply with individual manufacturer's cleaning instructions.
- C. Clean each surface or unit to condition expected in normal, commercial building cleaning and maintenance program, including but not limited to:
  - 1. Interior Cleaning:
    - a. Clean inside glazing, exercising care not to scratch glass.
    - b. Remove marks, stains, fingerprints and dirt.
    - c. Clean and polish woodwork and finish hardware.
    - d. Remove labels that are not permanent labels.
    - e. Clean plumbing fixtures and tile work. Remove spots, soil or paint.
    - f. Clean surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.
    - g. Clean other fixtures and equipment and remove stains, paint, dirt, and dust.
    - h. Remove temporary floor protection and clean floors.
  - 2. Exterior Cleaning:
    - a. Clean outside glazing, exercising care not to scratch glass.
    - b. Remove marks, stains, and dirt from exterior surfaces.
    - c. Clean and polish finish hardware.
    - d. Remove temporary protection systems.
    - e. Clean dirt, mud, and other foreign material from paving, sidewalks, and gutters.
    - f. Clean drop inlets, through-curb drains, and other drainage structures.
    - g. Remove trash, debris, and foreign material from landscaped areas.

**END OF SECTION**

**SECTION 01 7700**  
**CLOSEOUT PROCEDURES**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Closeout Procedures.

**1.2 GENERAL**

- A. Closeout process consists of three specific project closeout inspections. Contractor shall plan sufficient time in construction schedule to allow for required inspections before expiration of Contract Time.
- B. Contractor shall conduct his own inspections of The Work and shall not request closeout inspections until The Work of the contract is reasonably complete and correction of obvious defects or omissions are complete or imminent.
- C. Date of Substantial Completion shall not occur until completion of construction work, unless agreed to by Architect and included on Certificate of Substantial Completion.

**1.3 PRELIMINARY CLOSEOUT REVIEW**

- A. When Architect, Owner and Contractor agree that project is ready for closeout, Pre-Substantial Inspection shall be scheduled. Preparation of floor substrate to receive carpeting and any work which could conceivably damage or stain carpet must be completed, as carpet installation will be scheduled immediately following this inspection.
- B. Prior to this inspection, completed test and evaluation reports for HVAC system and font, where one occurs, are to be provided to Project Manager, Architect, and applicable consultants.
- C. Architect and his appropriate consultants, together with Contractor and mechanical, plumbing, fire protection, and electrical sub-contractors shall conduct a space by space and exterior inspection to review materials and workmanship and to demonstrate that systems and equipment are operational.
  - 1. Punch list of items requiring completion and correction will be created.
  - 2. Time frame for completion of punch list items will be established, and date for Substantial Completion Inspection shall be set.

**1.4 SUBSTANTIAL COMPLETION INSPECTION**

- A. When Architect, Owner and Contractor agree that project is ready for Substantial Completion, an inspection is held. Punch list created at Pre-Substantial Inspection is to be substantially complete.
- B. Prior to this inspection, Contractor shall discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups and similar elements.

- C. Architect, Owner and Contractor review completion of punch list items. When Owner and Architect confirm that Contractor has achieved Substantial Completion of The Work, Owner, Architect and Contractor will execute Certificate of Substantial Completion that contains:
1. Date of Substantial Completion.
  2. Punch List Work not yet completed, including seasonal and long lead items.
  3. Amount to be withheld for completion of Punch List Work.
  4. Time period for completion of Punch List Work.
  5. Amount of liquidated damages set forth in Supplementary Conditions to be assessed if Contractor fails to complete Punch List Work within time set forth in Certificate.
- D. Contractor shall present Closeout Submittals to Architect and place tools, spare parts, extra stock, and similar items required by Contract Documents in locations as directed by Facilities Manager.

### **1.5 FINAL ACCEPTANCE MEETING**

- A. When punch list items except for any seasonal items or long lead items which will not prohibit occupancy are completed, Final Acceptance Meeting is held.
- B. Owner, Architect and Contractor execute Owner's Project Closeout - Final Acceptance form, and verify:
1. All seasonal and long lead items not prohibiting occupancy, if any, are identified, with committed to completion date and amount to be withheld until completion.
  2. Owner's maintenance personnel have been instructed on all system operation and maintenance as required by the Contract Documents.
  3. Final cleaning requirements have been completed.
- C. If applicable, once any seasonal and long lead items are completed, Closeout Inspection is held where Owner and Architect verify that The Work has been satisfactorily completed, and Owner, Architect and Contractor execute Closeout portion of the Project Closeout - Final Acceptance form.
- D. When Owner and Architect confirm that The Work is satisfactorily completed, Architect will authorize final payment.

### **PART 2 - PRODUCTS Not Used**

### **PART 3 - EXECUTION Not Used**

**END OF SECTION**

**SECTION 01 7800****CLOSEOUT SUBMITTALS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Closeout Submittals.

**1.2 GENERAL**

- A. Workmanship bonds, final certifications, equipment check-out sheets, and similar documents.
- B. Releases enabling Owner unrestricted use of The Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
- C. Project photographs, damage or settlement survey, and similar record information required by Contract Documents.

**1.3 OPERATIONS AND MAINTENANCE DATA**

- A. Operations And Maintenance Manual(s) that include:
  - 1. Certifications required by Contract Documents.
  - 2. Copies of warranties required by Contract Documents.
  - 3. Copy of complete Project Manual including Addenda, Modifications as defined in General Conditions, and other interpretations issued during construction.
    - a. Mark these documents to show variations in actual Work performed in comparison with text of specifications and Modifications. Show substitutions, selection of options, and similar information, particularly on elements that are concealed or cannot otherwise be readily discerned later by direct observation.
    - b. Note related record drawing information and Product Data.
  - 4. Testing and Inspection Reports required by Contract Documents.

**1.4 WARRANTIES**

- A. When written guarantees beyond one (1) year after substantial completion are required by Contract Documents, secure such guarantees and warranties properly addressed and signed in favor of Owner. Include these documents in Operations & Maintenance Manual(s) specified above.
- B. Delivery of guarantees and warranties will not relieve Contractor from obligations assumed under other provisions of Contract Documents.

**1.5 PROJECT RECORD DOCUMENTS**

- A. Do not use record documents for construction purposes. Protect from deterioration and loss in secure, fire-resistive location. Provide access to record documents for Architect's reference during normal working hours.

- B. Maintain clean, undamaged set of Drawings. Mark set to show actual installation where installation varies from the Work as originally shown. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
  - 1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
  - 2. Mark new information that is important to Owner, but was not shown on Drawings.
  - 3. Note related Change Order numbers where applicable.

**1.6 SPARE PARTS**

- A. Provide items that are indicated in individual Sections.

**1.7 EXTRA STOCK MATERIALS**

- A. Provide items that are indicated in individual Sections.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

**END OF DIVISION**

**DIVISION 23: HEATING, VENTILATING, AND  
AIR-CONDITIONING**

**23 0500 COMMON WORK RESULTS FOR HVAC**

- 23 0501 COMMON HVAC REQUIREMENTS
- 23 0529 HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
- 23 0553 IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
- 23 0593 DUCT TESTING, ADJUSTING, AND BALANCING
- 23 0713 DUCT INSULATION
- 23 0719 HVAC PIPING INSULATION
- 23 0933 ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC

**23 1000 FACILITY FUEL SYSTEMS**

- 23 1123 FACILITY NATURAL GAS PIPING

**23 2000 HVAC PIPING AND PUMPS**

- 23 2300 REFRIGERANT PIPING
- 23 2350 REFRIGERANT PIPE COVER
- 23 2600 CONDENSATE DRAIN PIPING

**23 3000 HVAC AIR DISTRIBUTION**

- 23 3001 COMMON DUCT REQUIREMENTS
- 23 3114 LOW-PRESSURE METAL DUCTS
- 23 3300 AIR DUCT ACCESSORIES

**23 4000 HVAC AIR CLEANING DEVICES**

- 23 4100 AIR FILTERS

**23 5000 CENTRAL HEATING EQUIPMENT**

- 23 5135 AIR PIPING
- 23 5417 GAS-FIRED FURNACES

**23 6000 CENTRAL COOLING EQUIPMENT**

- 23 6214 COMPRESSOR UNITS: AIR CONDITIONING (5 TON OR LESS)

END OF TABLE OF CONTENTS

**SECTION 23 0501****COMMON HVAC REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Common requirements and procedures for HVAC systems.
  - 2. Responsibility for proper operation of electrically powered equipment furnished under this Division.
  - 3. Interface with Testing And Balancing Agency.
  - 4. Furnish and install sealants relating to installation of systems installed under this Division.
  - 5. Furnish and install Firestop Penetration Systems for HVAC system penetrations as described in Contract Documents.
  - 6. Furnish and install sound, vibration, and seismic control elements.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Sleeves, inserts, and equipment for mechanical systems installed under other Sections.
- C. Related Requirements:
  - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for exterior concrete pads and bases for mechanical equipment.
  - 2. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
  - 3. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
  - 4. Section 07 9213: 'Elastometric Joint Sealant' for quality of sealants used at building exterior.
  - 5. Section 07 9219: 'Acoustical Joint Sealants' for quality of acoustical sealants.
  - 6. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.
  - 7. Section 26 2913: 'Enclosed Controllers' for magnetic starters and thermal protective devices (heaters) not factory mounted integral part of mechanical equipment.
  - 8. Division 26: Raceway and conduit, unless specified otherwise, line voltage wiring, outlets, and disconnect switches.
  - 9. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.
  - 10. Sections Under 33 5000 Heading: Fuel Distribution Utilities.

**1.2 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's catalog data for each manufactured item.
      - 1) Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
      - 2) Include name, address, and phone number of each supplier.
  - 2. Shop Drawings:
    - a. Schematic control diagrams for each separate fan system, heating system, control panel, etc. Each diagram shall show locations of all control and operational components and devices. Mark correct operating settings for each control device on these diagrams.

- b. Diagram for electrical control system showing wiring of related electrical control items such as firestats, fuses, interlocks, electrical switches, and relays. Include drawings showing electrical power requirements and connection locations.
- c. Drawing of each temperature control panel identifying components in panels and their function.
- d. Other shop drawings required by Division 23 trade Sections.

**B. Closeout Submittals:**

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Operations and Maintenance Data (Modify and add to requirements of Section 01 7800):
    - 1) At beginning of HVAC section of Operations And Maintenance Manual, provide master index showing items included.
      - a) Provide name, address, and phone number of Architect, Architect's Mechanical Engineer, General Contractor, and HVAC, Sheet Metal, Refrigeration, and Temperature Control subcontractors.
      - b) Identify maintenance instructions by using same equipment identification used in Contract Drawings. Maintenance instructions shall include:
        - (1) List of HVAC equipment used indicating name, model, serial number, and nameplate data of each item together with number and name associated with each system item.
        - (2) Manufacturer's maintenance instructions for each piece of HVAC equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance and lubrication instructions.
        - (3) Summary list of mechanical equipment requiring lubrication showing name of equipment, location, and type and frequency of lubrication.
        - (4) Manual for Honeywell T7350 thermostat published by Honeywell.
      - c) Provide operating instructions to include:
        - (1) General description of each HVAC system.
        - (2) Step by step procedure to follow in putting each piece of HVAC equipment into operation.
        - (3) Provide diagrams for electrical control system showing wiring of items such as smoke detectors, fuses, interlocks, electrical switches, and relays.
  - b. Warranty Documentation:
    - 1) Include copies of warranties required in individual Sections of Division 23.
  - c. Record Documentation:
    - 1) Manufacturers documentation:
      - a) Copies of approved shop drawings.

### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Perform work in accordance with applicable provisions of Gas Ordinances applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
  - 2. In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing work affected by such differences.
  - 3. Identification:
    - a. Motor and equipment name plates as well as applicable UL / ULC and AGA / CGA labels shall be in place when Project is turned over to Owner.
- B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
  - 1. Company:
    - a. Company specializing in performing work of this section.
      - 1) Minimum five (5) years experience in HVAC installations.
      - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
    - b. Upon request, submit documentation.
  - 2. Installer:

- a. Licensed for area of Project.
- b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
- c. Upon request, submit documentation.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  1. Accept valves on site in shipping containers with labeling in place.
- B. Storage And Handling Requirements:
  1. In addition to requirements specified in Division 01:
    - a. Stored material shall be readily accessible for inspection by Architect until installed.
    - b. Store items subject to moisture damage, such as controls, in dry, heated spaces.
    - c. Provide temporary protective coating on cast iron and steel valves.
    - d. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
  2. Protect bearings during installation. Thoroughly grease steel shafts to prevent corrosion.

#### 1.5 WARRANTY

- A. Manufacturer Warranty:
  1. Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record 'start-up' date of each piece of equipment on certificate.
- B. Special Warranty:
  1. Guarantee HVAC systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
  2. If HVAC sub-contractor with offices located more than **150 miles (240 km)** from Project site is used, provide service / warranty work agreement for warranty period with local HVAC sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

### PART 2 - PRODUCTS

#### 2.1 COMPONENTS

- A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.
- B. Pipe And Pipe Fittings:
  1. Use domestic made pipe and pipe fittings on Project.
  2. Weld-O-Let and Screw-O-Let fittings are acceptable.
- C. Sleeves:
  1. In Framing: Standard weight galvanized iron pipe, Schedule 40 PVC, or **14 ga (2 mm)** galvanized sheet metal two sizes larger than bare pipe or insulation on insulated pipe.
  2. In Concrete And Masonry: Sleeves through outside walls, interior shear walls, and footings shall be schedule 80 black steel pipe with welded plate.
- D. Valves:
  1. Valves of same type shall be of same manufacturer.

## **PART 3 - EXECUTION**

### **3.1 INSTALLERS**

- A. Acceptable Installers:
1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

### **3.2 EXAMINATION**

- A. Drawings:
1. HVAC Drawings show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
  2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over HVAC Drawings.
  3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.
- B. Verification Of Conditions:
1. Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work. Examine adjoining work on which mechanical work is dependent for efficiency and report work that requires correction.
  2. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.
  3. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.
  4. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.

### **3.3 PREPARATION**

- A. Changes Due To Equipment Selection:
1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings, if requested by Architect, showing proposed installations.
  2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
  3. Provide any additional motors, valves, controllers, fittings, and other additional equipment required for proper operation of system resulting from selection of equipment.
  4. Be responsible for the proper location of roughing-in and connections provided under other Divisions.

### **3.4 INSTALLATION**

- A. Interface With Other Work:

1. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and see they are properly installed.
  2. Electrical: Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
  3. Testing And Balancing:
    - a. Put HVAC systems into full operation and continue their operation during each working day of testing and balancing.
    - b. Make changes in pulleys, belts, fan speeds, and dampers or add dampers as required for correct balance as recommended by Testing And Balancing Agency and at no additional cost to Owner.
- B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.
- C. Locating Equipment:
1. Arrange pipes, ducts, and equipment to permit ready access to valves, cocks, unions, traps, filters, starters, motors, control components, and to clear openings of doors and access panels.
  2. Adjust locations of pipes, ducts, switches, panels, and equipment to accommodate work to interferences anticipated and encountered.
  3. Install HVAC work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
  4. Determine exact route and location of each pipe and duct before fabrication.
    - a. Right-Of-Way:
      - 1) Lines that pitch shall have right-of-way over those that do not pitch. For example, steam, steam condensate, and drains shall normally have right-of-way.
      - 2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.
    - b. Offsets, Transitions, and Changes in Direction:
      - 1) Make offsets, transitions, and changes in direction in pipes and ducts as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
      - 2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.
- D. Piping:
1. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus.
    - a. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper erection of systems of piping in every respect.
    - b. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings.
      - 1) Arrange so as to facilitate removal of tube bundles.
      - 2) Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.
        - a) Make connections of dissimilar metals with di-electric unions.
        - b) Install valves and unions ahead of traps and strainers. Provide unions on both sides of traps.
      - 3) Do not use reducing bushings, street elbows, bull head tees, close nipples, or running couplings.
      - 4) Install piping systems so they may be easily drained. Provide drain valves at low points and manual air vents at high points in hot water heating and cooling water piping.
      - 5) Install piping to insure noiseless circulation.
      - 6) Place valves and specialties to permit easy operation and access. Valves shall be regulated, packed, and glands adjusted at completion of work before final acceptance.
    - c. Do not install piping in shear walls.
  2. Properly make adequate provisions for expansion, contraction, slope, and anchorage.

- a. Cut piping accurately for fabrication to measurements established at site. Remove burr and cutting slag from pipes.
  - b. Work piping into place without springing or forcing. Make piping connections to pumps and other equipment without strain at piping connection. Remove bolts in flanged connections or disconnect piping to demonstrate that piping has been so connected, if requested.
  - c. Make changes in direction with proper fittings.
  - d. Expansion of Thermoplastic Pipe:
    - 1) Provide for expansion in every 30 feet (9 meters) of straight run.
    - 2) Provide 12 inch (300 mm) offset below roof line in each vent line penetrating roof.
  3. Provide sleeves around pipes passing through concrete or masonry floors, walls, partitions, or structural members. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete floors on grade. Seal sleeves with specified sealants.
    - a. Sleeves through floors shall extend 1/4 inch (6 mm) above floor finish in mechanical equipment rooms above basement floor. In other rooms, sleeves shall be flush with floor.
    - b. Sleeves through floors and foundation walls shall be watertight.
  4. Provide spring clamp plates (escutcheons) where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.
  5. Remove dirt, grease, and other foreign matter from each length of piping before installation.
    - a. After each section of piping used for movement of water or steam is installed, flush with clean water, except where specified otherwise.
    - b. Arrange temporary flushing connections for each section of piping and arrange for flushing total piping system.
    - c. Provide temporary cross connections and water supply for flushing and drainage and remove after completion of work.
- E. Penetration Firestops: Install Penetration Firestop System appropriate for penetration at HVAC system penetrations through walls, ceilings, roofs, and top plates of walls.
- F. Sealants:
1. Seal openings through building exterior caused by penetrations of elements of HVAC systems.
  2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.

### 3.5 REPAIR / RESTORATION

- A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
  2. Surface finishes shall exactly match existing finishes of same materials.

### 3.6 FIELD QUALITY CONTROL

- A. Field Tests:
1. Perform tests on HVAC piping systems. Furnish devices required for testing purposes.
- B. Non-Conforming Work:
1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.
  2. Repeat tests on new material, if requested.

### 3.7 SYSTEM START-UP

- A. Off-Season Start-up:

1. If Substantial Completion inspection occurs during heating season, schedule spring start-up of cooling systems. If inspection occurs during cooling season, schedule autumn start-up for heating systems.
  2. Notify Owner seven days minimum before scheduled start-up.
  3. Time will be allowed to completely service, test, check, and off-season start systems. During allowed time, train Owner's representatives in operation and maintenance of system.
  4. At end of off-season start-up, furnish Owner with letter confirming that above work has been satisfactorily completed.
- B. Preparations that are to be completed before start up and operation include, but are not limited to, following:
1. Dry out electric motors and other equipment to develop and properly maintain constant insulation resistance.
  2. Make adjustments to insure that:
    - a. Equipment alignments and clearances are adjusted to allowable tolerances.
    - b. Nuts and bolts and other types of anchors and fasteners are properly and securely fastened.
    - c. Packed, gasketed, and other types of joints are properly made up and are tight and free from leakage.
    - d. Miscellaneous alignments, tightenings, and adjustments are completed so systems are tight and free from leakage and equipment performs as intended.
  3. Motors and accessories are completely operable.
  4. Inspect and test electrical circuitry, connections, and voltages to be properly connected and free from shorts.
  5. Adjust drives for proper alignment and tension.
  6. Make certain filters in equipment for moving air are new and of specified type.
  7. Properly lubricate and run-in bearings in accordance with Manufacturer's directions and recommendations.

### 3.8 CLEANING

- A. Clean exposed piping, ductwork, and equipment.
- B. No more than one week before Final Inspection, flush out bearings and clean other lubricated surfaces with flushing oil. Provide best quality and grade of lubricant specified by Equipment Manufacturer.
- C. Replace filters in equipment for moving air with new filters of specified type no more than one week before Final Inspection.

### 3.9 CLOSEOUT ACTIVITIES

- A. Instruction Of Owner:
  1. Instruct building maintenance personnel and Stake Physical Facilities Representative in operation and maintenance of mechanical systems utilizing Operation And Maintenance Manual when so doing:
    - a. Minimum Instruction Periods:
      - 1) HVAC: Four (4) hours.
      - 2) Temperature Control: Four (4) hours.
      - 3) Refrigeration: Two (2) hours.
    - b. Conduct instruction periods after Substantial Completion inspection when systems are properly working and before final payment is made. None of these instructional periods shall overlap another.

### 3.10 PROTECTION

- A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to

keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.

- B. Do not operate pieces of equipment used for moving supply air without proper air filters installed properly in system.
- C. After start-up, continue necessary lubrication and be responsible for damage to bearings while equipment is being operated up to Substantial Completion.

**END OF SECTION**

**SECTION 23 0529****HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Common hanger and support requirements and procedures for HVAC systems.
- B. Related Requirements:
  - 1. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
  - 2. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
  - 3. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.
- C. Products Installed But Not Furnished Under This Section:
  - 1. Stencils and band colors of gas piping used in HVAC equipment.
- D. Related Requirements:
  - 1. Section 09 9124: 'Interior Painted Metal' for providing field painting of identification of piping used with HVAC equipment.
  - 2. Section 23 0553: 'Identification For HVAC Piping And Equipment' for HVAC piping and equipment identification signage requirements.
  - 3. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Section 09 9124 to coordinate with Section 23 0529 for location of identification of HVAC piping and equipment to be field painted and Section 23 0553 for painting requirements of HVAC piping and equipment.
  - 2. Section 23 0529 to coordinate with Section 23 0553 for stencil and band color locations and identification requirements of HVAC piping and equipment for field application.

**1.3 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's catalog data for each manufactured item.

**PART 2 - PRODUCTS****2.1 ASSEMBLIES**

- A. Manufacturers:
  - 1. Class Two Quality Standard Approved Manufacturers. See Section 01 6200:
    - a. Anvil International, Portsmouth, NH [www.anvilintl.com](http://www.anvilintl.com).
    - b. Cooper B-Line, Highland, IL [www.cooperblineline.com](http://www.cooperblineline.com).
    - c. Erico International, Solon, OH [www.erico.com](http://www.erico.com).

- d. Hilti Inc, Tulsa, OK [www.hilti.com](http://www.hilti.com).
- e. Minerallac, Hampshire, IL [www.minerallac.com](http://www.minerallac.com).
- f. Thomas & Betts, Memphis, TN [www.superstrut.com](http://www.superstrut.com).
- g. Unistrut, Wayne, MI [www.unistrut.com](http://www.unistrut.com).

B. Performance:

1. Design Criteria:

- a. Support rods for single pipe shall be in accordance with following table:

Rod Diameter	Pipe Size	Rod Diameter	Pipe Size
3/8 inch	2 inches and smaller	10 mm	50 mm and smaller
1/2 inch	2-1/2 to 3-1/2 inches	13 mm	63 mm to 88 mm
5/8 inch	4 to 5 inches	16 mm	100 mm to 125 mm
3/4 inch	6 inches	19 mm	150 mm
7/8 inch	8 to 12 inches	22 mm	200 mm to 300 mm

- b. Support rods for multiple pipes supported on steel angle trapeze hangers shall be in accordance with following table:

Rods		Number of Pipes per Hanger for Each Pipe Size						
No.	Diameter	2 Inch	2.5 Inch	3 Inch	4 Inch	5 Inch	6 Inch	8 Inch
2	3/8 Inch	Two	0	0	0	0	0	0
2	1/2 Inch	Three	Three	Two	0	0	0	0
2	5/8 Inch	Six	Four	Three	Two	0	0	0
2	5/8 Inch	Nine	Seven	Five	Three	Two	Two	0
2	5/8 Inch	Twelve	Nine	Seven	Five	Three	Two	Two

Rods		Number of Pipes per Hanger for Each Pipe Size						
No.	Diameter	50mm	63mm	75mm	100mm	125mm	150mm	200mm
2	10 mm	Two	0	0	0	0	0	0
2	13 mm	Three	Three	Two	0	0	0	0
2	16 mm	Six	Four	Three	Two	0	0	0
2	19 mm	Nine	Seven	Five	Three	Two	Two	0
2	22 mm	Twelve	Nine	Seven	Five	Three	Two	Two

- 1) Size trapeze angles so bending stress is less than 10,000 psi (69 Mpa).

C. Materials:

1. Hangers, Rods, Channels, Attachments, And Inserts:

- a. Galvanized and UL approved for service intended.
- b. Support horizontal piping from clevis hangers or on roller assemblies with channel supports, except where trapeze type hangers are explicitly shown on Drawings. Hangers shall have double nuts.
- c. Class Two Quality Standards:
  - 1) Support insulated pipes with clevis hanger equal to Anvil Fig 260 or roller assembly equal to Anvil Fig 171 with an insulation protection shield equal to Anvil Fig 167. Gauge and length of shield shall be in accordance with Anvil design data.
  - 2) Except uninsulated copper pipes, support uninsulated pipes from clevis hanger equal to Anvil Fig 260. Support uninsulated copper pipe from hanger equal to Anvil Fig CT-65 copper plated hangers and otherwise fully suitable for use with copper tubing.
- d. Riser Clamps For Vertical Piping:
  - 1) Class Two Quality Standard: Anvil Figure 261.
- e. Furnace / Fan Coil Support Channel:
  - 1) Class One Quality Standard: Unistrut P1000.
  - 2) Acceptable Manufacturers: Hilti, Thomas & Betts.
  - 3) Equal as approved by Architect before installation. See Section 01 6200.
- f. Swivel Attachment:
  - 1) Class One Quality Standard: Unistrut EM3127.
  - 2) Acceptable Manufacturers: Hilti, Thomas & Betts.
  - 3) Equal as approved by Architect before installation. See Section 01 6200.

**EXECUTION****2.2 INSTALLATION**

- A. Piping:
1. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.
    - a. Except for underground pipe, suspend piping from roof trusses or clamp to vertical walls using support channels and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
    - b. Supports For Horizontal Piping:
      - 1) Support metal piping at **96 inches (2 400)** mm on center maximum for pipe **1-1/4 inches (32 mm)** or larger and **72 inches (1 800 mm)** on center maximum for pipe **1-1/8 inch (28 mm)** or less.
      - 2) Support thermoplastic pipe at **48 inches (1 200 mm)** on center maximum.
      - 3) Provide support at each elbow. Install additional support as required.
    - c. Supports for Vertical Piping:
      - 1) Place riser clamps at each floor or ceiling level.
      - 2) Securely support clamps by structural members, which in turn are supported directly from building structure.
      - 3) Provide clamps as necessary to brace pipe to wall.
    - d. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.
    - e. Expansion of Thermoplastic Pipe:
      - 1) Provide for expansion in every **30 feet (9 meters)** of straight run.
      - 2) Provide **12 inch (300 mm)** offset below roof line in each vent line penetrating roof.

**END OF SECTION**

**SECTION 23 0553****IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But not Installed Under This Section:
1. Identification of HVAC piping and equipment as described in Contract Documents including:
    - a. Paint identification for gas piping used in HVAC equipment.
    - b. Stencils and band colors for gas piping used in HVAC equipment.
- B. Related Requirements:
1. Section 09 9124: 'Interior Painted Metal' for providing field painting of identification of piping used with HVAC equipment.
  2. Section 22 0529: 'Hangers And Supports For Plumbing' for field installation of pipe stencils and band colors for identification for piping used with HVAC equipment.

**PART 2 - PRODUCTS****2.1 SYSTEMS**

- A. Description:
1. Abbreviations for Pipe Stencils and Equipment Identification and Band Colors for Pipe Identification:
    - a. Apply stenciled symbols and continuous painting as follows:
 

Pipe Type	Pipe Color	Symbol
Gas	Yellow	GAS
- B. Materials:
1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
  2. Description:
    - a. Ferrous Metal:
      - 1) New Surfaces: Use MPI(a) INT 5.1B Waterborne Light Industrial Finish system.
  3. Performance Requirements:
    - a. New Surfaces: MPI Premium Grade finish requirements.
    - b. Maintain specified colors, shades, and contrasts.
  4. Paint (one coat):
    - a. Primer:
      - 1) Ferrous Metal:
        - a) MPI 107, 'Primer, Rust-Inhibitive, Water Based'.
          - (1) Color: white.
      - b. Finish Coat (two coats):
        - 1) Ferrous Metal:
          - a) MPI 153, 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.
  5. Labels:
    - a. Equipment Identification:
      - 1) Black formica, with white reveal when engraved.
      - 2) Lettering to be **3/16 inch (5 mm)** high minimum.

**PART 3 - EXECUTION****3.1 APPLICATION****A. Labels:**

1. Identify following items with specified labels fastened to equipment with screws (unless noted otherwise):
  - a. Thermostats and control panels in mechanical spaces (attach label to wall directly above or below thermostats).
  - b. Furnaces.
  - c. Condensing units.

**B. Painting:**

1. New Surfaces:
  - a. Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.
2. Leave equipment in like-new appearance.
3. Only painted legends, directional arrows, and color bands are acceptable.
4. Locate identifying legends, directional arrows, and color bands at following points on exposed piping of each piping system:
  - a. Adjacent to each item of equipment.
  - b. At point of entry and exit where piping goes through wall.
  - c. On each riser and junction.
  - d. Every **25 feet (7.620 m)** on long continuous lines.
  - e. Stenciled symbols shall be **one inch (25 mm)** high and black.

**END OF SECTION**

**SECTION 23 0593****DUCT TESTING, ADJUSTING, AND BALANCING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Test, balance, and adjust air duct systems as described in Contract Documents.
- B. Related Sections:
  - 1. Other Sections of Division 23:
    - a. Completing installation and start-up of mechanical systems, and changing sheaves, belts, and dampers as required for correct balance.
    - b. Assisting Balancing Agency in testing and balancing of mechanical system.

**1.2 SYSTEM DESCRIPTION**

- A. Performance Requirements:
  - 1. Perform testing and balancing in complete accordance with Associated Air Balance Council Standards for Field Measurement & Instructions, Form P1266, Volume I. Record test data on AABC standard forms or facsimile.
  - 2. Noise level shall not exceed PNC 35 in Chapel or Cultural Center when all mechanical equipment is operating.

**1.3 SUBMITTALS**

- A. Quality Assurance / Control:
  - 1. Four copies of complete test data for evaluation and approval.
  - 2. Test And Balance Report:
    - a. Complete with logs, data, and records as required herein. Print logs, data, and records on white bond paper bound together in report form.
    - b. Certified accurate and complete by Balancing Agency's certified test and balance engineer.
    - c. Contain following general data in format selected by Balancing Agency.
      - 1) Project Number.
      - 2) Project Title.
      - 3) Project Location.
      - 4) Project Architect and Mechanical Engineer.
      - 5) Test and Balance Agency and Certified Engineer.
      - 6) Contractor and mechanical sub-contractor.
      - 7) Dates tests were performed.
      - 8) Certification Document.
      - 9) Report Forms similar to AABC Standard format.
    - d. Report shall include following:
      - 1) Preface suggesting abnormalities and problems encountered.
      - 2) Instrumentation List including type, model, manufacturer, serial number, and calibration dates.
      - 3) System Identification reporting location of zones, supply, return, and exhaust openings.
      - 4) Record following for each piece of air handling equipment:
        - a) Manufacturer, model number, and serial number.
        - b) Design and manufacturer rated data.
        - c) Actual CFM.
        - d) Suction and discharge static pressure of each fan.

- e) Outside-air and return-air total CFM.
  - f) Actual operating current, voltage, and brake horsepower of each fan motor.
  - g) Final RPM of each motor.
  - h) Fan and motor sheave manufacturer, model, size, number of grooves and center distance.
  - i) Belt size and quantity.
  - j) Static-pressure controls final operating set points.
3. Bind approved copy of report in Operations And Maintenance Manual for Division 23.

#### 1.4 QUALITY ASSURANCE

- A. Qualifications:
  1. Work of this Section shall be performed by independent Air Testing And Balance Agency specializing in testing and balancing of heating, ventilating, and cooling systems to balance, adjust, and test air moving equipment, air distribution, and exhaust systems.
  2. Agency shall provide proof of having successfully completed at least five years of specialized experience in air and hydronic system balancing. Work by this Agency shall be done under direct supervision of qualified heating and ventilating engineer employed by Agency.
  3. Agency shall be approved in writing by Architect.
  4. Neither Architect's engineering consultant or anyone performing work on this Project under other Sections of Division 23 shall be permitted to do this work.

#### 1.5 SCHEDULING

- A. Award test and balance subcontract to Agency upon receipt of Notice To Proceed to allow Agency to schedule this work in cooperation with other Sections involved and to comply with completion date.
- B. Do not begin air testing and balancing until:
  1. After completion of air cooling, heating, and exhaust systems including installation of specialties, devices, and new filters.
  2. Proper function of control system components including electrical interlocks, damper sequences, air and water reset, and fire and freeze stats has been verified.
  3. Automatic temperature controls have been calibrated and set for design operating conditions.
  4. Verification of proper thermostat calibration and setting of control components such as static pressure controllers and other devices that may need set points changed during process of balancing system.

#### PART 2 - PRODUCTS: Not Used

#### PART 3 - EXECUTION

##### 3.1 PREPARATION

- A. Heating, ventilating, and cooling systems and equipment shall be in full operation and continue in operation during each working day of testing and balancing.

##### 3.2 FIELD QUALITY CONTROL

- A. Site Tests:
  1. If requested, conduct tests in presence of Architect.
  2. Instruments used by Agency shall be accurately calibrated and maintained in good working order.
  3. Air Testing And Balancing Procedure:

- a. Perform tests at high and low speeds of multi-speed systems and single speed systems. Perform following testing and balancing functions in accordance with Associated Air Balance Council National Standards:
    - 1) Fan Speeds: Furnaces And Fan Coil Units (with direct drive motors): Set fan speed to lowest possible setting that will achieve design CFM requirements. Adjust down from Contractor setting, if necessary.
    - 2) Current And Voltage: Measure and record motor current and voltage.
    - 3) Pitot-Tube Traverse: Perform pitot-tube traverse of main supply and return ducts to obtain total CFM.
    - 4) Outside Air: Test and adjust system minimum outside air by pitot-tube traverse.
    - 5) Static Pressure: Test and record system static pressures, including suction and discharge static pressure of each fan.
    - 6) Air Temperature: Take wet and dry bulb air temperatures on entering and leaving side of each cooling coil. Dry bulb temperatures shall be taken on entering and leaving side of each heating unit.
    - 7) Main Ducts: Adjust main ducts to within design CFM requirements and traverse for total CFM quantities.
    - 8) Branch Ducts: Adjust branch ducts to within design CFM requirements. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.
    - 9) Tolerances: Test and balance each diffuser, grille, and register to within 10 percent of design requirements.
    - 10) Identification: Identify the location and area of each grille, diffuser, and register. Record on air outlet data sheets.
    - 11) Description: Record size, type, and manufacturer of each diffuser, grille, and register on air outlet data sheets.
    - 12) Drafts: Adjust diffusers, grilles, and registers to minimize drafts.
  - b. Permanently mark all outside air, supply air, and return air damper positions after balancing has been completed.
- B. Final Inspection And Adjustments:
1. System shall be balanced and reports submitted to Architect before final inspection.
  2. Balancing Agency shall be represented at final inspection meeting by qualified testing personnel with balancing equipment and two copies of air balancing test report.
    - a. Architect will choose and direct spot balancing of one zone. Differences between the spot balance and test report will be justification for requiring repeat of testing and balancing for entire building. If recheck testing demonstrates measured flow deviation of 10 percent or more from recorded information on report, report will be rejected and new inspection and report will be made and resubmitted.
    - b. Perform re-balancing in presence of Architect and subject to its approval.
    - c. If re-balancing is required, submit revised air test and balance reports to Architect before Substantial Completion.
    - d. Spot balance and rebalance shall be performed at no additional cost to Owner.
  3. Where furnace supplied to job site provides over 5 percent more air than schedule requirements, rooms supplied by that furnace shall have their supply air quantities increased by ratio of actual total air quantity supplied to minimum air quantity required by furnace schedule.

**END OF SECTION**

**SECTION 23 0713****DUCT INSULATION****PART 4 - GENERAL****4.1 SUMMARY**

## A. Includes But Not Limited To:

1. Furnish and install thermal wrap duct insulation as described in Contract Documents.

## B. Related Requirements:

1. Section 23 3114: 'Low-Pressure Metal Ducts'.
2. Section 23 3300: 'Acoustic Duct Accessories' for duct liner.

**PART 5 - PRODUCTS****5.1 MANUFACTURERS**

## A. Manufacturer Contact List:

1. Certainteed St Gobain, Valley Forge, PA [www.certainteed.com](http://www.certainteed.com).
2. Johns-Manville, Denver, CO [www.jm.com](http://www.jm.com).
3. Knauf Fiber Glass, Shelbyville, IN [www.knauffiberglass.com](http://www.knauffiberglass.com) or Toronto, ON (416) 593-4322.
4. Manson Insulation Inc, Brossard, QB [www.isolationmanson.com](http://www.isolationmanson.com).
5. Owens-Corning, Toledo, OH or Owens-Corning Canada Inc, Willowdale, ON [www.owenscorning.com](http://www.owenscorning.com).

**5.2 MATERIALS**

## A. Thermal Wrap Duct Insulation:

1. 1-1/2 inch (38 mm) or 3 inch (76 mm) thick fiberglass with factory-laminated, reinforced aluminum foil scrim kraft facing and density of 0.75 lb / per cu ft (12 kg / per cu m).
2. Thermal Conductivity: 0.27 BTU in/HR SF deg F at 75 deg F (24 deg C) maximum.
3. Type One Acceptable Products:
  - a. Type 75 standard duct insulation by Certainteed St Gobain.
  - b. Microlite FSK by Johns-Manville.
  - c. Duct Wrap FSK by Knauf Fiber Glass.
  - d. Alley Wrap FSK by Manson Insulation Inc.
  - e. FRK by Owens-Corning.
  - f. Equal as approved by Architect before bidding. See Section 01 6200.

**PART 6 - EXECUTION****6.1 INSTALLATION**

## A. Thermal Wrap Duct Insulation:

1. Install insulation as follows:
  - a. Within Building Insulation Envelope:
    - 1) 1-1/2 inches (38 mm) thick on rectangular outside air ducts and combustion air ducts.
    - 2) 1-1/2 inches (38 mm) thick on all round ducts.
  - b. Outside Building Insulation Envelope:

- 1) 3 inch (76 mm) thick on round supply and return air ducts.
  - 2) 1-1/2 inch (38 mm) thick on rectangular, acoustically lined, supply and return air ducts.
2. Wrap insulation tightly on ductwork with circumferential joints butted and longitudinal joints overlapped minimum 2 inches (50 mm).
- a. Do not compress insulation except in areas of structural interference. Minimum thickness at corners shall be one inch (25 mm) thick.
  - b. Remove insulation from lap before stapling.
  - c. Staple seams at approximately 16 inches (400 mm) on center with outward clenching staples.
  - d. Seal seams with foil vapor barrier tape or vapor barrier mastic. Seal penetrations of facing to provide vapor tight system.

B. Insulate outside of ceiling diffusers, diffuser drops, and duct silencers same as ductwork.

**END OF SECTION**

**SECTION 23 0719**

**HVAC PIPING INSULATION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install insulation on above ground refrigerant piping and fittings as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 0501: 'General HVAC Requirements'.
  - 2. Section 23 2300: 'Refrigerant Piping'.

**1.2 DELIVERY, STORAGE, AND HANDLING**

- A. Storage And Handling Requirements:
  - 1. Keep materials and work dry and free from damage.
  - 2. Replace wet or damaged materials at no additional cost to Owner.

**PART 2 - PRODUCTS**

**2.1 ASSEMBLIES**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Armacell, Mebane, NC [www.armacell.com](http://www.armacell.com).
    - b. Childers Products Co, Eastlake, OH [www.fosterproducts.com](http://www.fosterproducts.com).
    - c. Foster Products Corp, Oakdale, MN [www.fosterproducts.com](http://www.fosterproducts.com).
    - d. Johns-Manville, Denver, CO [www.jm.com](http://www.jm.com).
    - e. Knauf, Shelbyville, IN [www.knauffiberglass.com](http://www.knauffiberglass.com).
    - f. Manson, Brossard, BC, Canada [www.isolationmanson.com](http://www.isolationmanson.com).
    - g. Nitron Industries, Thousand Oaks, CA [www.nitronindustries.com](http://www.nitronindustries.com).
    - h. Owens-Corning, Toledo, OH [www.owenscorning.com](http://www.owenscorning.com) or Owens-Corning Canada Inc, Willowdale, ON (416) 733-1600.
    - i. Ramco, Lawrenceville, NJ [www.ramco.com](http://www.ramco.com).
    - j. Nomac, Zebulon, NC [www.nomaco.com](http://www.nomaco.com).
    - k. Speedline Corp, Solon, OH [www.speedlinepvc.com](http://www.speedlinepvc.com).

- B. Materials:
  - 1. Refrigeration Piping System:
    - a. Thickness:

Pipe Size, Outside Diameter	Insulation Thickness
One inch and smaller	1/2 Inch
1-1/8 to 2 inch	3/4 Inch

- 1) **One inch** sheet for fittings as recommended by Manufacturer.
- 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a) AP Armaflex 25/50 by Armacell.
  - b) Nitrolite by Nitron Industries. White only for exterior.

- c) Nomaco K-Flex.
- b. Joint Sealer:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Armacell 520 by Armacell.
    - b) Namaco K-Flex R-373.
- c. Insulation Tape:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Armaflex AP Insul Tape by Armacell.
    - b) FT182 Tape by Nitron Industries.
    - c) Elastomeric Foamtape by Nomac K-Flex.
- d. Exterior Finish:
  - 1) For application to non-white, exterior insulation.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) WB Armaflex Finish by Armacell.
    - b) R-374 Protective Coating by Nomaco K-Flex.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Before application of insulating materials, brush clean surfaces to be insulated and make free from rust, scale, grease, dirt, moisture, and any other deleterious materials.
- B. Use drop cloths over equipment and structure to prevent adhesives and other materials spotting the work.

### **3.2 INSTALLATION**

- A. Refrigeration System Piping System:
  - 1. General:
    - a. Install insulation in snug contact with pipe.
      - 1) Insulate flexible pipe connectors.
      - 2) Insulate thermal expansion valves with insulating tape.
      - 3) Insulate fittings with sheet insulation and as recommended by Manufacturer.
    - b. Slip insulation on tubing before tubing sections and fittings are assembled keeping slitting of insulation to a minimum.
    - c. Do not install insulation on lines through clamp assembly of pipe support. Butt insulation up against sides of clamp assembly.
    - d. Stagger joints on layered insulation. Seal joints in insulation.
    - e. Install insulation exposed outside building so 'slit' joint seams are placed on bottom of pipe.
    - f. Paint exterior exposed, non-white insulation with two coats of specified exterior finish.
  - 2. System Requirements:
    - a. Condensing Units: Install insulation on above ground refrigerant suction piping and fittings, including thermal bulb, from thermal expansion valve.

### **3.3 FIELD QUALITY CONTROL**

- A. Non-Conforming Work:
  - 1. Method of installing insulation shall be subject to approval of Architect. Sloppy or unworkmanlike installations are not acceptable.

### **3.4 CLEANING**

- A. Leave premises thoroughly clean and free from insulating debris.

**3.5 PROTECTION**

- A. Protect insulation wherever leak from valve stem or other source might drip on insulated surface, with aluminum cover or shield rolled up at edges and sufficiently large in area and of shape that dripping will not splash on surrounding insulation.

**END OF SECTION**

**SECTION 23 0933****ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC****PART 1 - GENERAL****1.1 SUMMARY**

## A. Includes But Not Limited To:

1. Furnish and install automatic temperature control system as described in Contract Documents.
2. Furnish and install conductors and make connections to control devices, motors, and associated equipment.
3. Assist in air test and balance procedure.

## B. Related Requirements:

1. Section 23 0593: Duct testing, adjusting, and balancing of ductwork.
2. Section 23 0501: Common HVAC Requirements.
3. Section 23 3300: Furnishing and installing of temperature control dampers.
4. Division 26:
  - a. Furnishing and installing of raceway, conduit, and junction boxes, including pull wires, for temperature control system except as noted above.
  - b. Power wiring to magnetic starters, disconnect switches, and motors.
  - c. Motor starters and disconnect switches, unless integral with packaged equipment.

**1.2 SUBMITTALS**

## A. Action Submittals:

1. Product Data:
  - a. Installer to provide product literature or cut sheets for all products specified in Project.
  - b. Installer to provide questions of control equipment locations to Mechanical Engineer prior to installation.

## B. Informational Submittals:

1. Certificates:
  - a. Installer must provide 'Certificate of Sponsorship' signed from Approved Distributor with bid confirming Installer sponsorship.

## C. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Operations and Maintenance Data:
    - 1) Leave with O&M Manual specified in Section 23 0501.
  - b. Record Documentation:
    - 1) Installer's 'Certificate of Sponsorship'.

**1.3 QUALITY ASSURANCE**

## A. Qualifications: Requirements of Section 01 4301 applies, but is not limited to the following:

1. Installer:
  - a. Before bidding, obtain sponsorship from a local, Approved Distributor specified under PART 2 PRODUCTS of this specification. Initial requirements for sponsorship are:
    - 1) Receive LCBS Connect product training from Approved Distributor.
    - 2) Installer to provide Distributor sponsorship by submitting 'Certificate of Sponsorship' as Informational Submittal with bid. Certificate available as Attachment in this Specification.

**PART 2 - PRODUCTS****2.1 SYSTEMS****A. Manufacturers:**

1. Manufacturer Contact List:
  - a. Air Products & Controls Ltd, Pontiac, MI [www.ap-c.com](http://www.ap-c.com).
  - b. Fire-Lite Alarms, Northford, CT [www.firelite.com](http://www.firelite.com).
  - c. Honeywell Inc, Minneapolis, MN [www.honeywell.com](http://www.honeywell.com).
    - 1) Primary Contact: Chris Brinkerhoff, (801) 550-3344, [chris.brinkerhoff@honeywell.com](mailto:chris.brinkerhoff@honeywell.com).
  - d. ICCA Firex, Carol Stream, IL [www.icca.invensys.com](http://www.icca.invensys.com).
  - e. Insul\_Guard, Salt Lake City, UT:
    - 1) Primary Contact: Dan Craner, (801) 518-3733, [insul\\_guard@comcast.net](mailto:insul_guard@comcast.net).
  - f. System Sensor, St Charles, IL [www.systemsensor.com](http://www.systemsensor.com).
  - g. Zimmerman Technologies, Renton, WA:
    - 1) Primary Contact: Tracy Zimmerman, (425) 255-1906, [zimmtech@yahoo.com](mailto:zimmtech@yahoo.com).

**B. Distributors: Obtain LCBS Connect control devices, RP panels, sensors, actuators and other control equipment from following Sponsoring Approved Distributors. See Section 01 4301:**

1. Colorado:
  - a. CD Jones: (720) 943 1495 [Mglaub@cdjones.com](mailto:Mglaub@cdjones.com) Mark Glaub
2. Utah:
  - a. Control Equipment Co: (800) 452-1457 [rhowe@controlequiputah.com](mailto:rhowe@controlequiputah.com) Ray Howe.
  - b. Building Controls & Solutions (801) 214-3313 [Kathy.Wright@Building-Controls.com](mailto:Kathy.Wright@Building-Controls.com) Kathy Wright.

**C. Performance:**

1. Design Criteria:
  - a. Honeywell LCBS Connect control system with cloud based gateway:
    - 1) General Requirements:
      - a) Controls multistage equipment, dehumidification and ventilation with 2 wire connection to controller interface location in occupied space.
      - b) Adjustable backlight to controller interface module from 15%-100%en after 30 seconds of setting adjustments.
      - c) System controllers can be programmed from the interface module or from the cloud service.
      - d) LCBS Connect controller utilizes echelon communication network with the controller located near the mechanical equipment and the system interface located in the occupied space.
      - e) System shall control outdoor ventilation air based upon system occupancy of electric / electronic actuation of dampers.
      - f) CO2 (Carbon Dioxide) sensors will open ventilation dampers only when CO2 exceeds 1000 ppm.
      - g) LCBS Connect devices access via internet Chrome browser via gateway.
      - h) Wired room temperature sensors may be added as specified.
    - 2) System Requirements:
      - a) Up to 3 Heat/2 Cool Heat Pumps; Up to 3 Heat/2 Cool Conventional Systems.
      - b) Tri-Lingual display (Selectable for English, Spanish, or French).
      - c) 18 to 30 Vac.
      - d) 50 Hz; 60 Hz.
      - e) System switch to include Auto changeover for Heat-Cool.
      - f) 7-Day Programming.
      - g) 365-Day Event Scheduling.
      - h) Display Security Lockout options.
      - i) Minimum/ Maximum Temperature Range Stops.
      - j) Configurable over-ride option.
      - k) Remote Access via internet.
      - l) Dehumidification setting range 40 to 80% RH.

## D. Components:

1. Controller, Wall Module:
  - a. Controller and Display Kit:
    - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - a) Part Number Honeywell YCRL6438SR1000 consisting of following:
        - (1) Unitary Controller: Honeywell CRL6438SR1000
        - (2) Wall Module: Honeywell TS120
      - b) Wall Cover Plate: Honeywell. 50002883-001.
      - c) Discharge Air / Return Air Sensors: Honeywell C7041B2005 20k ohms.
      - d) Outdoor Air Sensor: Honeywell C7041F2006.
      - e) Indoor Air Sensor: Sylk bus network; Honeywell TR40
      - f) Averaging sensor: Sylk bus network; Honeywell TR40
    - 2) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - a) LCBS Connect Gateway Module: Honeywell LGW1000.
2. Sealant Compound:
  - a. Description:
    - 1) Non hardening waterproof, vapor proof, self-adhesive for hot or cold application for sealing conduit openings against drafts, dust moisture and noise.
  - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) Duct Seal Compound No. DS-130 by Gardner Bender, Menomonee Falls , WI.  
[www.gardnerbender.com](http://www.gardnerbender.com).
    - 2) Thumb-Tite Sealing Compound No. 4216-92 by Nu-Calgon, St. Louis, MO  
[www.nucalgon.com](http://www.nucalgon.com).
3. Guard For Cultural Center Sensors:
  - a. Match color of sensor.
  - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) MSI-244 controller guard with integral wood base by Zimmerman Technologies.
    - 2) WMG 1 controller guard by Insul\_Guard.
4. Duct Smoke Detectors:
  - a. Duct mounted smoke detector in systems with airflow greater than 2000 CFM.
  - b. Intelligent low flow photoelectric duct smoke detector with flash scan.
  - c. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) System Sensor Model D4120.
5. Transformer:
  - a. 120 / 24 V, 50VA Honeywell AT150F.
  - b. 120 / 24 V, 75VA Honeywell AT175F.
6. Damper Actuators:
  - a. Electric type equipped for Class I wiring.
  - b. Shall not consume power during Unoccupied cycle or use chemicals or expandable media.
  - c. Have built in spring return.
  - d. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) Honeywell MS8105A1030/U.
    - 2) Honeywell MS8105A1130 w/ End switch.
7. Conductors:
  - a. Color-coded and No. 16 and No. 12 AWG Type TWN, TFN, or THHN, stranded.
  - b. Controller Cable: 12, 8, or 4 conductor, 18AWG solid copper wire, insulated with high-density polyethylene. Conductors parallel enclosed in brown PVC jacket (22 AWG cable not allowed).
  - c. Echelon Network Ebus Communicating Cable:
    - 1) Class Two Quality Standard. See Section 01 6200:
      - a) CAT 4, **22 gauge (0.025 in) (0.645 mm)**, twisted pair, non-plenum and non-shielded cable.
8. Local Relay (RP) Panels For Chapel And Cultural Center Systems:
  - a. **16-ga (1.59 mm)** screw cover, painted sheet metal. Box with cover and knockouts, pre-wired terminal strips, relay, and transformer.
  - b. Provide Labels with Distributor contact information on each panel.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Standard: LDS Model RP-6.
9. CO<sub>2</sub> (Carbon Dioxide) Return Air Sensor:

- a. Duct mount with display.
- b. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
  - 1) Honeywell: C7232B1006.

E. Operation Sequences:

1. Programmable controller shall control Unoccupied and Occupied status of fan system based on adjustable seven-day program. Fan shall run continuously in Occupied Mode and cycle in Unoccupied Mode.
2. Adjustable heating and cooling set points shall control space temperature by activating either heating or cooling equipment. Programmable controller provides automatic change over between heating and cooling.
3. Controller provides optional override by allowing timed override of program by pushing override on controller touch screen. This shall activate controller to Occupied Mode and system shall control to Occupied set point.
4. Minimum outdoor ventilation air damper, spring return type, shall open in controller Occupied Mode and remain closed in Unoccupied Mode.
5. Systems with CO<sub>2</sub> (Carbon Dioxide) sensor to control minimum, spring return type, outdoor ventilation air damper:
  - a. Damper shall open in controller Occupied Mode only when CO<sub>2</sub> sensor setpoint of 1000 ppm is reached. Damper shall close if CO<sub>2</sub> level drops below 900 ppm.
  - b. Damper shall remain closed in controller Unoccupied Mode.

## PART 3 - EXECUTION

### 3.1 INSTALLERS

A. Acceptable Installers. See Section 01 4301:

1. Approved HVAC Sub-Contractors shall be pre-approved and included in Construction Documents by Addendum.

### 3.2 INSTALLATION

A. Interface With Other Work:

1. Calibrate room controllers as required during air test and balance. Insulate sensor J-box with fiberglass insulation; expandable/ foam insulation is NOT acceptable.
2. Instruct air test and balance personnel in proper use and setting of control system components.
3. Install low voltage electrical wiring in accordance with Division 26 of these Specifications.

B. Echelon Communication: Ebus

1. Ebus cable needs to be installed at least **12 inches (300 mm)** from **lighting, motors, or low voltage switching cables**

C. Safety Controls: Interlock duct smoke detectors to keep heating, cooling, and system fan from operating when detector is energized.

D. Mount damper actuators and actuator linkages external of airflow. Make certain dampers operate freely without binding or with actuator housing moving.

E. Paste copy of record control wiring diagram on back of relay panel door cover for each multiple furnace system.

### 3.3 FIELD QUALITY CONTROL

A. Field Tests:

1. Calibrate, adjust, and set controls for proper operation, operate systems, and be prepared to prove operation of any part of control system. This work is to be completed before pre-substantial completion inspection.
2. Test each individual heating, cooling, and damper control for proper operation using control system.

### 3.4 SYSTEM STARTUP

#### A. For systems with LCBS Controller.

1. Contractor is responsible for a fully functioning control system accessible via internet web browser. Contractor is responsible to coordinate Network start up with assistance from local IT technician. Local IT technician shall provide available ports on network switch for LCBS gateway.
2. Contractor is responsible configuring all controllers with proper zone names, zone scheduling, proper Church conference / holiday scheduling, all to be coordinated with local FM manager. Set proper clock setting including day/month/year.
3. Set Heating / Cooling to proper stages
4. Set heat cycle rates to 9 cph and cooling to 4 cph.
5. Set DO1 relay to "Occupancy".
6. Set System switch operation to "Automatic" changeover.
7. Set fan switch operation to "ON".
8. Set minimum UnOcc start time for all days. No days shall be scheduled Unconfigured.
9. Set Occupied start times to match meeting start times; provided by local FM manager.
10. Place all zone over-ride durations to one (1) hour except for Bishop and Stake area which shall be set to two (2) hours.
11. Set Occupied default heating setpoints to 70 degrees, cooling setpoints to 74 degrees.
12. Set Unoccupied default heating setpoint to 60 degrees, cooling setpoints to 90 degrees.
13. Set each zone to applicable Holiday scheduling for General & Stake Conferences.

### ADJUSTING

#### B. LCBS controller configuration settings; the following are configuration guidelines for consistent installations:

1. Temperature Units Fahrenheit/ Celsius
2. Equipment Type Conventional/heat pump.
  - a. Stages of Heat 1,2
  - b. Stages of Cool 1,2
  - c. Fan operation in heat mode Enable Fan w/ Heat
3. Equipment Options
  - a. Leave at Default
  - b. Heating Cycles per Hour 6-9 cph
  - c. Cooling Cycles per Hour 3-4 cph
4. Recovery
  - a. Leave at Default
5. Economizer / DLC
  - a. Configure as required by control equipment.
6. Sensor Selection
  - a. Set according to averaging sensors
  - b. Set to multi sensor "Smart" when averaging.
  - c. Set Occupancy Sensor to "Disable".
7. Terminal Assignment
  - a. Set according to equipment
  - b. Set Terminal DO1 to Occupancy to control fresh air damper based upon scheduled occupancy or over-ride.
8. Dehumidification
  - a. Leave at default
  - b. See Accessory Loops
9. Miscellaneous
  - a. Leave at default

10. Sensor setting
  - a. Leave at default
  - b. Set as Required
11. Accessory Loops – Set as required
  - a. Hot water valve
  - b. Dehumidification
  - c. Other
12. Configure Zone Name (display on Home Screen).
13. Set Password to ABCD.
14. Set Occupied Setpoint
15. Set Unoccupied Setpoint
16. Set Schedule
17. MENU/ Holiday-Event Scheduler / Custom Events/ Create new event.
  - a. Mountain Time Zone:
    - 1) First Sunday in April: Unoccupied all zones for all day / every year.
    - 2) First Sunday in April: Unoccupied all zones for all day / every year.
    - 3) First Sunday in October: Unoccupied all zones for all day / every year.
    - 4) First Sunday in October: Unoccupied all zones for all day / every year.

### 3.5 CLOSEOUT ACTIVITIES

#### A. Instruction Of Owner:

1. Include as part of training required in Section 23 0501, following training:
  - a. Training shall be by personnel of installing company and utilize operator's manuals and as-built documentation.
  - b. Provide training in (2) two sessions including LCBS Connect sight & smart Apps for up to six (6) hours total:
    - 1) First session will occur between system completion and Substantial Completion.
    - 2) Second session will occur within forty-five (45) days of Substantial Completion when agreed upon by Owner.
  - c. Training shall include sequence of operation review, selection of displays, modification of schedules and setpoints, troubleshooting of sensors, etc, as follows:
    - 1) Control System Overview:
      - a) Show access to system through both individual controllers and Internet browser and how network works. Scheduling building at minimum for Stake and General Conference, special events.
    - 2) Controller Programming from Keypad: Instructions on developing setpoints and schedules and adjusting local zone temperatures.
    - 3) Web Internet training with local Facilities Manager during two (2) sessions.
      - a) Review all features accessible from the 'Settings' tab including Alarm points, user access, scheduling and humidity setpoints (where applied).

**END OF SECTION**

**ATTACHMENTS**

**CERTIFICATE OF SPONSORSHIP**  
**Electric and Electronic Control System for HVAC Installer**

**PROJECT INFORMATION** (To be filled out by Installer - available from project specification):

Project Name: \_\_\_\_\_  
 Project Number: \_\_\_\_\_  
 Project Address: \_\_\_\_\_

**INSTALLER INFORMATION** (To be filled out by Installer):

Installer Name: \_\_\_\_\_  
 Installer Firm: \_\_\_\_\_  
 Installer Address: \_\_\_\_\_

I acknowledge and confirm the above listed Installer has received training and exhibit LCBS Connect System skills and is qualified to install the automation control system as specified for Project identified above. Our company will stand behind the Installer meeting the legal specified performance requirements.

Sponsoring Approved Honeywell Distributor Name: \_\_\_\_\_

Signature: \_\_\_\_\_ Printed Signature: \_\_\_\_\_

Date: \_\_\_\_\_

**SECTION 23 1123****FACILITY NATURAL-GAS PIPING****PART 1 - GENERAL****1.1 SUMMARY**

## A. Includes But Not Limited To:

1. Furnish and install gas piping and fittings within building as described in Contract Documents.

## B. Related Requirements:

1. Sections Under 09 9000 Heading: 'Paints And Coatings' for painting of exterior piping.
2. Section 23 0501: 'Common HVAC Requirements'.
3. Section 23 0553: 'Identification for HVAC Piping and Equipment'.

**1.2 REFERENCES**

## A. Reference Standards:

1. American National Standards Institute / CSA Group:
  - a. ANSI LC 4-2012 (2017) / CSA 6.32-2012 (R2016), 'Press-Connect Metallic Fittings for Use in Fuel Gas Distribution Systems'.
2. ASTM International:
  - a. ASTM A53/A53M-12, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'.
  - b. ASTM A234/A234M-16, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service'.
  - c. ASTM D2513-16a, 'Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings'.
3. International Code Council (ICC):
  - a. ICC IFGC-2015: 'International Fuel Gas Code'.

**1.3 QUALITY ASSURANCE**

## A. Regulatory Agency Sustainability Approvals:

1. Conform to requirements of requirements of IFGC International Fuel Gas Code.
2. Viega MegaPressG fittings:
  - a. Conform to requirements of Canadian Standards Association CSA B149.1 and to requirements of IFGC International Fuel Gas Code.

## B. Qualifications:

1. Welders:
  - a. Welders shall be certified and bear evidence of certification thirty (30) days before commencing work on project.
  - b. If there is doubt as to proficiency of welder, Owner's Representative may require welder to take another test. This shall be done at no cost to Owner. Certification shall be by Pittsburgh Testing Laboratories or other approved authority.
2. Pipe Installers:
  - a. Polyethylene pipe installers shall be properly trained and certified in procedure for joining polyethylene pipe.

## 1.4 DELIVERY, STORAGE, AND HANDLING

### A. Storage And Handling Requirements:

1. Do not store polyethylene pipe so it is exposed to sunlight.

## PART 2 - PRODUCTS

### 2.1 SYSTEM

#### A. Manufacturers:

1. Manufacturer Contact List:
  - a. BrassCraft, Novi, MI [www.brasscraft.com](http://www.brasscraft.com).
  - b. Cimberio Valve Co Inc, Malvern, PA [www.cimberio.com](http://www.cimberio.com).
  - c. ConBraCo Industries, Inc, Matthews, NC [www.conbraco.com](http://www.conbraco.com) or ConBraCo / Honeywell Ltd, Scarborough, ON (416) 293-8111.
  - d. Dormont Manufacturing Company, Export, PA [www.dormont.com](http://www.dormont.com).
  - e. Jenkins-NH-Canada, Brantford, ON [www.jenkins-nh-canada.com](http://www.jenkins-nh-canada.com).
  - f. Jomar International, Madison Heights, MI [www.jomar.com](http://www.jomar.com).
  - g. California Valves (formally KOSO) by Pacific Seismic Products Inc, Lancaster, CA, Distributed by Strand Earthquake Consultants [www.strandearthquake.net](http://www.strandearthquake.net).
  - h. Viega LLC, Broomfield, CO [www.viega.com](http://www.viega.com).
  - i. Watts Regulator Co, North Andover, MA [www.wattsreg.com](http://www.wattsreg.com) or Watts Industries (Canada) Inc, Burlington, ON (888) 208-8927.

#### B. Materials:

1. Above-Ground Pipe:
  - a. Black carbon steel, butt welded, Schedule 40 pipe meeting requirements of A53/A53M.
2. Above-Ground Pipe Fittings:
  - a. Welded forged steel fittings meeting requirements of ASTM A234/A234M.
  - b. Standard weight malleable iron screwed.
  - c. Viega MegaPressG fittings.
3. Valves:
  - a. **125 psi (862 kPa)** bronze body ball valve, UL listed.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) CIM 102.1 by Cimbrio Valve.
    - 2) Apollo Series 80-100 by ConBraCo.
    - 3) 'Red Cap' R602 by Jenkins NH Canada.
    - 4) Model T-204 by Jomar International.
    - 5) Model B-6000-UL by Watts Regulator.
4. Cocks:
  - a. Gauge Cocks: Conbraco Series 50-56 bronze gauge cock.
5. Flexible Connector:
  - a. Type 304 stainless steel corrugated tube coated for corrosion protection.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Dormont Supr-Safe.
    - 2) BrassCraft Procoat.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

#### A. Steel pipe installed through air plenums, in walls:

1. Pipes **2-1/2 inches (64 mm)** and larger shall have welded fittings and joints.
2. Other steel pipe may have screwed or welded fittings.
3. Viega MegaPressG:

- a. Install MegaPressG fittings according to Manufacture's recommendations and with Manufacture's recommended tools.
- B. Lay underground pipe in accordance with Manufacturer's recommendations and local gas utility company regulations and specifications.
  1. Provide **24 inch (610 mm)** minimum steel pipe between vertical rise of riser and end of polyethylene line if anode-less riser is not used. Use plastic-to-steel transition or compression fitting between end of polyethylene line and steel meter riser. Provide cathodic protection for steel riser or use anode-less riser.
  2. Place tracer wire along side of polyethylene pipe from meter to point where pipe rises inside building.
  3. Place **4 inches (100 mm)** of sand around gas line buried underground.
  4. Do not install gas piping under building floor slabs-on-grade.
- C. After gas meter, valves, seismic valve and etc, gas piping should rise inside outside wall and not be visible to public.
- D. On lines serving gas-fired equipment, install gas cocks adjacent to equipment outside of equipment cabinet and easily accessible.
- E. Install **6 inch (150 mm)** long minimum dirt leg, with pipe cap, on vertical gas drop serving each gas-fired equipment unit.
- F. Use fittings for changes of direction in pipe and for branch runouts.
- G. Visible gas piping inside building shall be painted yellow and labeled.

### 3.2 FIELD QUALITY CONTROL

- A. Field tests:
  1. Subject all portions of gas piping system, in sections or in entirety, to air pressure of **75 psig (0.52 MPa)** and prove airtight for four (4) hours.
  2. Disconnect equipment not suitable for **75 psig (0.52 MPa)** pressure from piping system during test period.

**END OF SECTION**

**SECTION 23 2300****REFRIGERANT PIPING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install piping and specialties for refrigeration systems as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 0501: 'Common HVAC Requirements'.
  - 2. Section 23 0719: 'Refrigerant Piping Insulation'.
  - 3. Section 23 6214: 'Compressor Units: Air Conditioning (5 Ton or less)'.
  - 4. Section 23 5417: 'Gas-Fired Furnaces'.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. Federal Emergency Management Agency (FEMA) / Vibration Isolation and Seismic Control Manufacturers Association (VISCMA) / American Society of Civil Engineers (ASCE):
    - a. FEMA 412, 'Installing Seismic Restraints For Mechanical Equipment' (December 2002).
  - 2. Vibration Isolation and Seismic Control Manufacturers Association (VISCMA):
    - a. VISCMA 101-15, 'Seismic Restraint Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.
    - b. VISCMA 102-12, 'Vibration Isolation Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.
- B. Definitions:
  - 1. Refrigerant: Absorbs heat by a change of state (evaporation) from liquid to a gas, and releases heat by a change of state (condenses) from gas back to a liquid.
  - 2. Vibration Isolation: Vibration reduction in which an isolation system is placed between the source of unwanted vibration and an item which needs to be shielded from the vibration.
- C. Reference Standards:
  - 1. American National Standards Institute (ANSI) / American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
    - a. ANSI/ASHRAE 15-2016 and 34-2016, 'Safety Standard and Designation and Classification of Refrigerants'.
  - 2. American National Standards Institute / American Welding Society:
    - a. ANSI/AWS A5.8M/A5.8-2011, 'Specification for Filler Metals for Brazing and Braze Welding'.
  - 3. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
    - a. 2011 ASHRAE Handbook - HVAC Applications.
      - 1) Chapter 48, 'Noise and Vibration Control'.
  - 4. ASTM International:
    - a. ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel'.
    - b. ASTM B280-18, 'Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service'.
  - 5. National Fire Protection Association / American National Standards Institute:
    - a. NFPA 90A: 'Installation of Air-Conditioning and Ventilating Systems' (2018 or most recent edition adopted by AHJ).
  - 6. Underwriters Laboratories:
    - a. UL 2182, 'Refrigerants' (April 2006).

### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings: Show each individual equipment and piping support.
- B. Informational Submittals:
  - 1. Qualification Statements: Technician certificate for use of HFC and HCFC refrigerants.

### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Refrigerants:
    - a. Underwriters Laboratories / Underwriters Laboratories of Canada:
      - 1) Comply with requirements of UL 2182.
- B. Qualifications. Section 01 4301 applies, but is not limited to the following:
  - 1. Installer: Refrigerant piping shall be installed by refrigeration contractor licensed by State and by technicians certified in use of HFC and HCFC refrigerants.

## PART 2 - PRODUCTS

### 2.1 COMPONENTS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Airtec, Fall River, MA, [www.noventcaps.com](http://www.noventcaps.com).
    - b. Cooper Industries, Houston, TX [www.cooperindustries.com](http://www.cooperindustries.com).
    - c. Cush-A-Clamp by ZSI Manufacturing, Canton, MI [www.cushaclamp.com](http://www.cushaclamp.com).
    - d. Elkhart Products Corp, Elkhart, IN [www.elkhartproducts.com](http://www.elkhartproducts.com).
    - e. Emerson Climate Technologies, St Louis, MO [www.emersonflowcontrols.com](http://www.emersonflowcontrols.com).
    - f. Handy & Harman Products Division, Fairfield, CT [www.handy-1.com](http://www.handy-1.com).
    - g. Harris Products Group, Cincinnati, OH [www.harrisproductsgroup.com](http://www.harrisproductsgroup.com).
    - h. Henry Valve Co, Melrose Park, IL [www.henrytech.com](http://www.henrytech.com).
    - i. Hilti Inc, Tulsa, OK [www.hilti.com](http://www.hilti.com).
    - j. Hydra-Zorb Co, Auburn Hills, MI [www.hydra-zorb.com](http://www.hydra-zorb.com).
    - k. JB Industries, Aurora, IL [www.jbind.com](http://www.jbind.com).
    - l. Mason Industries, inc, [www.Mason-ind.com](http://www.Mason-ind.com)
    - m. Mueller Steam Specialty, St Pauls, NC [www.muellersteam.com](http://www.muellersteam.com).
    - n. Nibco Inc, Elkhart, IN [www.nibco.com](http://www.nibco.com).
    - o. Packless Industries, Waco, TX [www.packless.com](http://www.packless.com).
    - p. Parker Corp, Cleveland, OH [www.parker.com](http://www.parker.com).
    - q. Sporlan Valve Co, Washington, MO [www.sporlan.com](http://www.sporlan.com). (also ZoomLock)
    - r. Sherwood Valves, Washington, PA [www.sherwoodvalve.com](http://www.sherwoodvalve.com).
    - s. Thomas & Betts, Memphis, TN [www.superstrut.com](http://www.superstrut.com).
    - t. Unistrut, Div of Atkore International, Inc., Harvey, IL [www.unistrut.com](http://www.unistrut.com).
    - u. Universal Metal Hose, Chicago, IL [www.universalmetalhose.com](http://www.universalmetalhose.com).
    - v. Vibration Mountings & Controls, Bloomingdale, NJ [www.vmc-kdc.com](http://www.vmc-kdc.com).
    - w. Virginia KMP Corp, Dallas, TX [www.virginiakmp.com](http://www.virginiakmp.com).
- B. Materials:
  - 1. Refrigerant Piping:
    - a. Meet requirements of ASTM B280, hard drawn straight lengths. Soft copper tubing not permitted.
    - b. Do not use pre-charged refrigerant lines.
  - 2. Refrigerant Fittings:
    - a. Wrought copper with long radius elbows.

- b. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
  - 1) Mueller Streamline.
  - 2) Nibco Inc.
  - 3) Elkhart.
  - 4) Sporlan - ZoomLock [Flame-Free Refrigerant Fittings]
- 3. Tee Access:
  - a. Brass:
    - 1) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
      - a) JB Industries: Part #A3 Series with Factory Cap and Valve Core.
- 4. Connection Material:
  - a. Sporlan - ZoomLock Flame-Free Refrigerant Fittings with factory approved tools
  - b. Brazing Rods in accordance with ANSI/AWS A5.8M/A5.8:
    - 1) Copper to Copper Connections:
      - a) Classification BCuP-4 Copper Phosphorus (6 percent silver).
      - b) Classification BCuP-5 Copper Phosphorus (15 percent silver).
    - 2) Copper to Brass or Copper to Steel Connections: Classification BAg-5 Silver (45 percent silver).
    - 3) Do not use rods containing Cadmium.
  - c. Flux:
    - 1) Type Two Acceptable Products:
      - a) Stay-Silv White Brazing Flux by Harris Products Group.
      - b) High quality silver solder flux by Handy & Harmon.
      - c) Equal as approved by Architect before use. See Section 01 6200.
- 5. Valves:
  - a. Manual Refrigerant Shut-Off Valves:
    - 1) Ball valves designed for refrigeration service and full line size.
    - 2) Valve shall have cap seals.
    - 3) Valves with hand wheels are not acceptable.
    - 4) Provide service valve on each liquid and suction line at compressor.
    - 5) If service valves come as integral part of condensing unit, additional service valves shall not be required.
    - 6) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
      - a) Henry.
      - b) Mueller.
      - c) Sherwood.
      - d) Virginia.
- 6. Filter-Drier:
  - a. On lines **3/4 inch (19 mm)** outside diameter and larger, filter-drier shall be replaceable core type with Schrader type valve.
  - b. On lines smaller than **3/4 inch (19 mm)** outside diameter, filter-drier shall be sealed type with brazed end connections.
  - c. Size shall be full line size.
  - d. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - 1) Emerson Climate Technologies.
    - 2) Mueller.
    - 3) Parker.
    - 4) Sporlan.
    - 5) Virginia.
- 7. Sight Glass:
  - a. Combination moisture and liquid indicator with protection cap.
  - b. Sight glass shall be full line size.
  - c. Sight glass connections and sight glass body shall be solid copper or brass, no copper-coated steel sight glasses allowed.
  - d. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) HMI by Emerson Climate Technologies.
- 8. Flexible Connectors:
  - a. Designed for refrigerant service with bronze seamless corrugated hose and bronze braiding.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

- 1) Vibration Absorber Model VAF by Packless Industries.
  - 2) Vibration Absorbers by Virginia KMP Corp.
  - 3) Anaconda 'Vibration Eliminators' by Universal Metal Hose.
  - 4) Style 'BF' Spring-flex freon connectors by Vibration Mountings.
  - 5) ULCPS by Mason
9. Refrigerant Piping Supports:
- a. Base, Angles, And Uprights: Steel meeting requirements of ASTM A36.
  - b. Securing Channels:
    - 1) At Free-Standing Pipe Support:
      - a) Class One Quality Standard: P-1000 channels by Unistrut.
      - b) Acceptable Manufacturers: Hilti, Thomas & Betts.
      - c) Equal as approved by Architect before installation. See Section 01 6200.
    - 2) At Wall Support:
      - a) Class One Quality Standard: P-3300 channels by Unistrut.
      - b) Acceptable Manufacturers: Hilti, Thomas & Betts.
      - c) Equal as approved by Architect before installation. See Section 01 6200.
    - 3) At Suspended Support:
      - a) Class One Quality Standard: P-1001 channels by Unistrut.
      - b) Acceptable Manufacturers: Hilti, Thomas & Betts.
      - c) Equal as approved by Architect before installation. See Section 01 6200.
    - 4) Angle Fittings:
      - a) Class One Quality Standard: P-2626 90 degree angle by Unistrut.
      - b) Acceptable Manufacturers: Hilti, Thomas & Betts.
      - c) Equal as approved by Architect before installation. See Section 01 6200.
  - c. Pipe Clamps:
    - 1) Type Two Acceptable Manufacturers:
      - a) Hydra-Zorb.
      - b) ZSI Cush-A-Clamp.
      - c) Hilti Cush-A-Clamp.
      - d) Equal as approved by Architect before installation. See Section 01 6200.
10. Locking Refrigerant Cap:
- a. Provide and install on charging valves:
    - 1) Class One Quality Standard: 'No Vent' locking refrigerant cap.
    - 2) Acceptable Manufacturers: Airtec.
    - 3) Equal as approved by Architect before installation. See Section 01 6200.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Refrigerant Lines:
  1. Install as high in upper mechanical areas as possible. Do not install underground or in tunnels.
  2. Slope suction lines down toward compressor **one inch/10 feet (25 mm in 3 meters)**. Locate traps at vertical rises against flow in suction lines.
- B. Connections:
  1. Refrigeration system connections shall be copper-to-copper, copper-to-brass, or copper-to-steel type properly cleaned and brazed with specified rods. Use flux only where necessary. No soft solder (tin, lead, antimony) connections will be allowed in system.
  2. Braze manual refrigerant shut-off valve, sight glass, and flexible connections.
  3. Circulate dry nitrogen through tubes being brazed to eliminate formation of copper oxide during brazing operation.
- C. Specialties:
  1. Install valves and specialties in accessible locations. Install refrigeration distributors and suction outlet at same end of coil.
  2. Install thermostatic bulb as close to cooling coil as possible. Do not install on vertical lines.

3. Install equalizing line in straight section of suction line, downstream of and reasonably close to thermostatic bulb. Do not install on vertical lines.
  4. Provide flexible connectors in each liquid line and suction line at both condensing unit and evaporator on systems larger than five tons. Anchor pipe near each flexible connector.
- D. Refrigerant Supports:
1. Support Spacing:
    - a. Piping 1-1/4 inch (32 mm) And Larger: 8 feet (2.450 m) on center maximum.
    - b. Piping 1-1/8 inch (28.5 mm) And Smaller: 6 feet (1.80 m) on center maximum.
    - c. Support each elbow.
  2. Isolate pipe from supports and clamps with Hydrozorb or Cush-A-Clamp systems.
  3. Run protective cover continuous from condensing units to risers or penetrations at building wall.

### 3.2 FIELD QUALITY CONTROL

- A. Field Tests:
1. Make evacuation and leak tests in presence of Architect's Engineer after completing refrigeration piping systems. Positive pressure test will not suffice for procedure outlined below.
    - a. Draw vacuum on each entire system with two stage vacuum pump. Draw vacuum to 300 microns using micron vacuum gauge capable of reading from atmosphere to 10 microns. Do not use cooling compressor to evacuate system nor operate it while system is under high vacuum.
    - b. Break vacuum with nitrogen and re-establish vacuum test. Vacuum shall hold for 30 minutes at 300 microns without vacuum pump running.
    - c. Conduct tests at 70 deg F (21 deg C) ambient temperature minimum.
    - d. Do not run systems until above tests have been made and systems started up as specified. Inform Owner's Representative of status of systems at time of final inspection and schedule start-up and testing if prevented by outdoor conditions before this time.
    - e. After testing, fully charge system with refrigerant and conduct test with Halide Leak Detector.
    - f. Recover all refrigerant in accordance with applicable codes. Do not allow any refrigerant to escape to atmosphere.
- B. Non-Conforming Work:
1. If it is observed that refrigerant lines are being or have been brazed without proper circulation of nitrogen through lines, all refrigerant lines installed up to that point in time shall be removed and replaced at no additional cost to Owner.

**END OF SECTION**

**SECTION 23 2350****REFRIGERANT PIPE COVER****PART 1 - GENERAL****1.1 SUMMARY**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and Section 23 0501 apply to this Section.

**PART 2 - PRODUCTS****2.1 BASIC COVER**

- A. Basic refrigerant line cover shall be 18 gauge steel, hot-dipped galvanized steel meeting the requirements of ASTM A361-85.
- B. Pop rivet attachments will not be allowed.
- C. All fastening devices shall be plated screws. Arrange covers so they may be taken apart for service.

**2.2 MANUFACTURED OUTER COVER**

- A. Refrigerant line covers at exterior walls shall be 24 ga steel, hot-dipped galvanized meeting requirements of ASTM A361-85, "Specification for Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process for Roofing and Siding", 1.25 oz/sq ft and complete with accessories recommended by Manufacturer for proper installation.
  - 1. Approved Manufacturers –
    - a. AEP / Span, Dallas, TX or San Diego, CA
    - b. Idose Aluminum Products, Allentown, PA
    - c. Berridge Manufacturing Co., Houston, TX
    - d. Copper Sales Inc., Minneapolis, MN
    - e. Engineered Components Inc., Stafford (Houston), TX
    - f. Fashion Inc., Lenaxa, KS
    - g. Alumax Building Specialties, Mesquite, TX
    - h. MM Systems Corp., Tucker, GA
    - i. Merchant & Evans Industries Inc., Burlington, NJ
    - j. Reynolds Metals Company, Richmond VA
- B. Finish:
  - 1. Fluoropolymer Resin-base finish for coil coating components. Thermo cured two coat system consisting of primer and top coat factory applied over properly pretreated metal.
  - 2. Color as selected by Engineer from Manufacturer's standard colors.
  - 3. Approved Manufacturers –
    - a. Equal to Duranar 200 by PPG or Fluoropon by Desoto containing 70% minimum Kynar 500 by Pennwalt Corp.

**PART 3 - INSTALLATION**

- A. Do not use pop rivets. All fastening devices shall be plated screws and arranged so covers may be taken off for service.
- B. Provide access opening for viewing the sight glass on the refrigerant line.

**END OF SECTION**

**SECTION 23 2600****CONDENSATE DRAIN PIPING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Coordinate installation of condensate drain piping with Section 22 0501 as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 22 0501: 'Common Plumbing Requirements'.
  - 2. Section 23 0501: 'Common HVAC Requirements'.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. ASTM International:

**PART 2 - PRODUCTS****2.1 SYSTEMS**

- A. Materials:
  - 1. Condensate Drains:
    - a. Schedule 40 PVC for condensate drains from furnace combustion chambers and furnace cooling coils.
  - 2. Solvent Cement and Adhesive Primer:
    - a. Use PVC solvent cement that has a VOC content of 510 g/L or less if required by local AHJ if required.
    - b. Use adhesive primer that has a VOC content of 550 g/L or less if required by local AHJ if required.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Condensate Drains:
  - 1. Support piping and protect from damage.
  - 2. Do not combine PVC condensate drain piping from furnace combustion chamber with copper condensate drain piping from cooling coil.

**END OF SECTION**

**SECTION 23 3001****COMMON DUCT REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

## A. Includes But Not Limited To:

1. General procedures and requirements for ductwork.
2. Repair leaks in ductwork, as identified by duct testing, at no additional cost to Owner.

## B. Related Requirements:

1. Section 23 0593: 'Duct Testing, Adjusting, and Balancing' for ductwork.
2. Section 07 9219: 'Acoustical Joint Sealants' for quality of acoustic sealant.
3. Section 23 0501: 'Common HVAC Requirements'.

**1.2 REFERENCES**

## A. Reference Standards:

1. Sheet Metal And Air Conditioning Contractors' National Association / American National Standards Institute:
  - a. SMACNA, 'HVAC Duct Construction Standards - Metal and Flexible' (4th Edition).

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conference: Schedule conference immediately before installation of ductwork.

**1.4 SUBMITTALS**

## A. Action Submittals:

1. Product Data: Specification data on sealer and gauze proposed for sealing ductwork.
2. Samples: Sealer and gauze proposed for sealing ductwork.

## B. Informational Submittals:

1. Manufacturer Instructions:
  - a. Installation manuals providing detailed instructions on assembly, joint sealing, and system pressure testing for leaks.

**PART 2 - PRODUCTS****2.1 ASSEMBLIES**

## A. Performance:

1. Design Criteria:
  - a. Standard Ducts: Construction details not specifically called out in Contract Documents shall conform to applicable requirements of SMACNA, 'HVAC Duct Construction Standards Metal and Flexible'.

## B. Materials:

1. Duct Hangers:

- a. **One inch (25 mm)** by **18 ga (1.27 mm)** galvanized steel straps or steel rods as shown on Drawings, and spaced not more than **96 inches (2 400 mm)** apart. Do not use wire hangers.
- b. Attaching screws at trusses shall be **2 inch (50 mm)** No. 10 round head wood screws. Nails not allowed.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. During installation, protect open ends of ducts by covering with plastic sheet tied in place to prevent entrance of debris and dirt.
- B. Make necessary allowances and provisions in installation of sheet metal ducts for structural conditions of building. Revisions in layout and configuration may be allowed, with prior written approval of Architect. Maintain required airflows in suggesting revisions.
- C. Hangers And Supports:
  1. Install pair of hangers as required by spacing indicated in table on Drawings.
  2. Install upper ends of hanger securely to floor or roof construction above by method shown on Drawings.
  3. Attach strap hangers to ducts with cadmium-plated screws. Use of pop rivets or other means will not be accepted.
  4. Secure vertical ducts passing through floors by extending bracing angles to rest firmly on floors without loose blocking or shimming. Support vertical ducts, which do not pass through floors, by using bands bolted to walls, columns, etc. Size, spacing, and method of attachment to vertical ducts shall be same as specified for hanger bands on horizontal ducts.

### **3.2 CLEANING**

- A. Clean interior of duct systems before final completion.

**END OF SECTION**

**SECTION 23 3114****LOW-PRESSURE METAL DUCTS****PART 1 - GENERAL****1.1 SUMMARY**

## A. Includes But Not Limited To:

1. Furnish and install above-grade low-pressure steel ducts and related items as described in Contract Documents.

## B. Products Installed But Not Furnished Under This Section:

1. Duct smoke detectors.

## C. Related Requirements:

1. Section 23 0593: 'Duct Testing, Adjusting, And Balancing' for duct test, balance, and adjust air duct systems services provided by Owner.
2. Section 23 0713: 'Duct Insulation' for thermal Insulation for ducts, plenum chambers, and casings.
3. Section 23 3001: 'Common Duct Requirements'.
4. Section 23 0933: 'Electric And Electronic Control System For HVAC':
  - a. Temperature control damper actuators and actuator linkages.
  - b. Furnishing of duct smoke detectors.

**1.2 REFERENCES**

## A. Association Publications:

1. Sheet Metal And Air Conditioning Contractors' National Association / American National Standards Institute:
2. SMACNA, 'HVAC Duct Construction Standards - Metal and Flexible' (4th edition).

## B. Reference Standards:

1. ASTM International:
  - a. ASTM A653/A653M-18, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
  - b. ASTM E84-18b, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
2. Underwriters Laboratories, Inc.:
  - a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (11th Edition - 2018).

**1.3 QUALITY ASSURANCE**

## A. Regulatory Agency Sustainability Approvals:

1. Duct Sealer:
  - a. Meet Class A flame spread rating in accordance with ASTM E84 or UL 723.

**1.4 DELIVERY, STORAGE, AND HANDLING**

## A. Storage and Handling Requirements:

1. Duct Sealer:

- a. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).
- b. Handle to prevent inclusion of foreign matter, damage by water, or breakage.
- c. Store in a cool dry location, but never under 35 deg F (1.7 deg C) or subjected to sustained temperatures exceeding 110 deg F (43 deg C) or as per Manufacturer's written recommendations.
- d. Do use sealants that have exceeded shelf life of product.

## 1.5 FIELD CONDITIONS

### A. Ambient Conditions:

1. Duct Sealer:
  - a. Do not apply under 35 deg F (1.7 deg C) or subjected to sustained temperatures exceeding 110 deg F (43 deg C) or as per Manufacturer's written recommendations.
  - b. Do not apply when rain or freezing temperatures will occur within seventy two (72) hours.

## PART 2 - PRODUCTS

### 2.1 SYSTEM

#### A. Materials:

1. Sheet Metal:
  - a. Fabricate ducts, plenum chambers and casings of zinc-coated, lock-forming quality steel sheets meeting requirements A653/A653M, with G 60 coating.
2. Duct Sealer For Interior Ducts:
  - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Duct Butter or ButterTak by Cain Manufacturing Co Inc, Pelham, AL [www.cainmfg.com](http://www.cainmfg.com).
    - 2) DP 1010, DP 1030 or DP 1015 by Design Polymeric, Fountain Valley, CA [www.designpoly.com](http://www.designpoly.com).
    - 3) PROseal, FIBERseal, EVERseal, or EZ-seal by Ductmate Industries, Inc., Charleroi, PA [www.ductmate.com](http://www.ductmate.com).
    - 4) SAS by Duro Dyne, Bay Shore, NY or Duro Dyne Canada, Lachine, QB [www.durodyne.com](http://www.durodyne.com).
    - 5) Iron Grip 601 by Hardcast Inc, Wylie, TX [www.hardcast.com](http://www.hardcast.com).
    - 6) MTS100 or MTS 200 by Hercules Mighty Tough, Denver CO, [www.herculesindustries.com](http://www.herculesindustries.com).
    - 7) 15-325 by Miracle / Kingco, Div ITW TACC, Rockland, MA [www.taccint.com](http://www.taccint.com).
    - 8) 44-39 by Mon-Eco Industries Inc, East Brunswick, NJ [www.mon-ecoindustries.com](http://www.mon-ecoindustries.com).
    - 9) Airseal Zero by Polymer Adhesive Sealant Systems Inc, Weatherford, TX [www.polymeradhesives.com](http://www.polymeradhesives.com).
    - 10) Airseal #22 Water Base Duct Sealer by Polymer Adhesive Sealant Systems Inc, Weatherford, TX [www.polymeradhesives.com](http://www.polymeradhesives.com).
3. Duct Sealer For Exterior Ducts:
  - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Two Part II Sealing System including RTA-50 liquid adhesive and DT-5300 for 3 inch (76 mm) and DT 5400 for 4 inch (100 mm) tape by Hardcast Inc, Wylie, TX [www.carlislehvac.com](http://www.carlislehvac.com).

#### B. Fabrication:

1. General:
  - a. Straight and smooth on inside with joints neatly finished.
  - b. Duct drops to diffusers shall be round, square, or rectangular to accommodate diffuser neck. Drops shall be same gauge as branch duct. Seal joints air tight.
2. Standard Ducts:
  - a. General:

- 1) Ducts shall be large enough to accommodate inside acoustic duct liner. Dimensions shown on Drawings are net clear inside dimensions after duct liner has been installed.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Metal duct surface must be clean and free of moisture, contamination and foreign matter before applying duct sealer for interior and exterior ducts.

#### **3.2 INSTALLATION**

- A. Install internal ends of slip joints in direction of flow. Seal transverse and longitudinal joints air tight using specified duct sealer as per Manufacturer's written instructions. Cover horizontal and longitudinal joints on exterior ducts with two layers of specified tape installed with specified adhesive.
- B. Securely anchor ducts and plenums to building structure with specified duct hangers attached with screws. Do not hang more than one duct from a duct hanger. Brace and install ducts so they shall be free of vibration under all conditions of operation.
- C. Ducts shall not bear on top of structural members.
- D. Paint ductwork visible through registers, grilles, and diffusers flat black.
- E. Properly flash where ducts protrude above roof.
- F. Under no conditions will pipes, rods, or wires be allowed to penetrate ducts.

#### **3.3 FIELD QUALITY CONTROL**

- A. Field Tests:
  1. Air Test and Balance Testing as specified in Section 01 4546: 'Duct Testing, Adjusting, and Balancing'.
- B. Non-Conforming Work:
  1. Reseal transverse joint duct leaks and seal longitudinal duct joint leaks discovered during air test and balance procedures at no additional cost to Owner.

**END OF SECTION**

**SECTION 23 3300****AIR DUCT ACCESSORIES****PART 1 - GENERAL****1.1 SUMMARY**

## A. Includes But Not Limited To:

1. Furnish and install duct accessories in specified ductwork as described in Contract Documents.

## B. Related Requirements:

1. Section 23 0933: 'Electric And Electronic Control System For HVAC' for temperature control damper actuators and actuator linkages.
2. Section 23 3001: 'Common Duct Requirements'.

**1.2 REFERENCES**

## A. Reference Standards:

1. ASTM International:
  - a. ASTM A653/A653M-18, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
  - b. ASTM C1071-16, 'Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)'.
  - c. ASTM C1338-14, 'Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings'.

**PART 2 - PRODUCTS****2.1 ACCESSORIES**

## A. Manufacturers:

1. Manufacturer Contact List:
  - a. AGM Industries, Brockton, MA [www.agmind.com](http://www.agmind.com).
  - b. Air Balance Inc, Holland, OH [www.airbalance.com](http://www.airbalance.com).
  - c. Air Filters Inc, Baltimore, MD [www.afinc.com](http://www.afinc.com).
  - d. Air-Rite Manufacturing, Bountiful, UT (801) 295-2529.
  - e. American Warming & Ventilating, Holland, OH [www.american-warming.com](http://www.american-warming.com).
  - f. Arrow United Industries, Wyalusing, PA [www.arrowunited.com](http://www.arrowunited.com).
  - g. Cain Manufacturing Company Inc, Pelham, AL [www.cainmfg.com](http://www.cainmfg.com).
  - h. C & S Air Products, Fort Worth, TX [www.csairproducts.com](http://www.csairproducts.com).
  - i. CertainTeed Corp, Valley Forge, PA [www.certainteed.com](http://www.certainteed.com).
  - j. Cesco Products, Florence, KY [www.cescoproducts.com](http://www.cescoproducts.com).
  - k. Daniel Manufacturing, Ogden, UT (801) 622-5924.
  - l. Design Polymerics, Fountain Valley, CA [www.designpoly.com](http://www.designpoly.com).
  - m. Ductmate Industries Inc, East Charleroi, PA [www.ductmate.com](http://www.ductmate.com).
  - n. Duro Dyne, Bay Shore, NY [www.durodyne.com](http://www.durodyne.com).
  - o. Dyn Air Inc. Lachine, QB [www.dynair.ca](http://www.dynair.ca)
  - p. Elgen Manufacturing Company, Inc. East Rutherford, NJ [www.elgenmfg.com](http://www.elgenmfg.com)
  - q. Flexmaster USA Inc, Houston, TX [www.flexmasterusa.com](http://www.flexmasterusa.com).
  - r. Greenheck Corp, Schofield, WI [www.greenheck.com](http://www.greenheck.com).
  - s. Gripnail Corp, East Providence, RI [www.gripnail.com](http://www.gripnail.com).
  - t. Hardcast Inc, Wylie, TX [www.hardcast.com](http://www.hardcast.com).

- u. Hercules Industries, Denver, CO, [www.herculesindustries.com](http://www.herculesindustries.com).
- v. Honeywell Inc, Minneapolis, MN [www.honeywell.com](http://www.honeywell.com).
- w. Industrial Acoustics Co, Bronx, NY [www.industrialacoustics.com](http://www.industrialacoustics.com).
- x. Johns-Manville, Denver, CO [www.jm.com](http://www.jm.com).
- y. Kees Inc, Elkhart Lake, WI [www.kees.com](http://www.kees.com).
- z. Knauf Fiber Glass, Shelbyville, IN [www.knauffiberglass.com](http://www.knauffiberglass.com).
- aa. Manson Insulation Inc, Brossard, QB [www.isolationmanson.com](http://www.isolationmanson.com).
- bb. Metco Inc, Salt Lake City, UT (801) 467-1572 [www.metcospiral.com](http://www.metcospiral.com).
- cc. Miracle / Kingco, Rockland, MA [www.taccint.com](http://www.taccint.com).
- dd. Mon-Eco Industries Inc, East Brunswick, NJ [www.mon-ecoindustries.com](http://www.mon-ecoindustries.com).
- ee. Nailor Industries Inc, Houston, TX [www.nailor.com](http://www.nailor.com).
- ff. Owens Corning, Toledo, OH [www.owenscorning.com](http://www.owenscorning.com).
- gg. Polymer Adhesive Sealant Systems Inc, Irving, TX [www.polymeradhesives.com](http://www.polymeradhesives.com).
- hh. Pottorff Company, Fort Worth, TX [www.pottorff.com](http://www.pottorff.com).
- ii. Ruskin Manufacturing, Kansas City, MO [www.ruskin.com](http://www.ruskin.com).
- jj. Sheet Metal Connectors Inc, Minneapolis, MN [www.smconnectors.com](http://www.smconnectors.com).
- kk. Tamco, Stittsville, ON [www.tamco.ca](http://www.tamco.ca).
- ll. Techno Adhesive, Cincinnati, OH [www.technoadhesives.com](http://www.technoadhesives.com).
- mm. Titus, Richardson, TX (972) 699-1030. [www.titus-hvac.com](http://www.titus-hvac.com)
- nn. McGill AirSeal, Columbus, OH [www.mcgillairseal.com](http://www.mcgillairseal.com).
- oo. United Enertech Corp, Chattanooga, TN [www.unitedenertech.com](http://www.unitedenertech.com).
- pp. Utemp Inc, Salt Lake City, UT (801) 978-9265.
- qq. Ventfabrics Inc, Chicago, IL [www.ventfabrics.com](http://www.ventfabrics.com).
- rr. Ward Industries, Grand Rapids MI [www.wardind.com](http://www.wardind.com).
- ss. Young Regulator Co, Cleveland, OH [www.youngregulator.com](http://www.youngregulator.com).

#### B. Materials:

1. Acoustical Liner System:
  - a. Duct Liner:
    - 1) **One inch (25 mm)** thick, **1-1/2 lb (0.68 kg)** density fiberglass conforming to requirements of ASTM C1071. Liner will not support microbial growth when tested in accordance with ASTM C1338.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) ToughGard by CertainTeed.
      - b) Duct Liner E-M by Knauf Fiber Glass.
      - c) Akousti-Liner by Manson Insulation.
      - d) Quiet R by Owens Corning.
      - e) Linacoustic RC by Johns-Manville.
  - b. Adhesive:
    - 1) Category Four Approved Water-Based Products. See Section 01 6200 for definitions of Categories:
      - a) Cain: Hydrotak.
      - b) Design Polymerics: DP2501 or DP2502 (CMCL-2501).
      - c) Duro Dyne: WSA.
      - d) Elgen: A-410-WB.
      - e) Hardcast: Coil-Tack.
      - f) Hercules: Mighty Tough Adhesives MTA500 or MTA600.
      - g) Miracle / Kingco: PF-101.
      - h) Mon-Eco: 22-67 or 22-76.
      - i) Polymer Adhesive: Glasstack #35.
      - j) Techno Adhesive: 133.
      - k) McGill AirSeal: Uni-tack.
    - 2) Category Four Approved Solvent-Based (non-flammable) Products. See Section 01 6200 for definitions of Categories:
      - a) Cain: Safetak.
      - b) Duro Dyne: FPG.
      - c) Hardcast: Glas-Grip 648-NFSE.
      - d) Miracle / Kingco: PF-91.
      - e) Mon-Eco: 22-24.
      - f) Polymer Adhesive: Q-Tack.

- g) Techno Adhesive: 'Non-Flam' 106.
- 3) Category Four Approved Solvent-Based (flammable) Products. See Section 01 6200 for definitions of Categories:
  - a) Cain: HV200.
  - b) Duro Dyne: MPG.
  - c) Hardcast: Glas-Grip 636-SE.
  - d) Miracle / Kingco: PF-96.
  - e) Mon-Eco: 22-22.
  - f) Polymer Adhesive: R-Tack.
  - g) Techno Adhesive: 'Flammable' 106.
- c. Fasteners:
  - 1) Adhesively secured fasteners not allowed.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) AGM Industries: 'DynaPoint' Series RP-9 pin.
    - b) Cain.
    - c) Duro Dyne.
    - d) Gripnail: May be used if each nail is installed by 'Grip Nail Air Hammer' or by 'Automatic Fastener Equipment' in accordance with Manufacturer's recommendations.
- 2. Flexible Equipment Connections:
  - a. 30 oz closely woven UL approved glass fabric double coated with neoprene.
  - b. Fire retardant, waterproof, air-tight, resistant to acids and grease, and withstand constant temperatures of **200 deg F (93 deg C)**.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Cain: N-100.
    - 2) Duro Dyne: MFN.
    - 3) Dyn Air: CPN with G-90 galvanized off-set seam.
    - 4) Elgen: ZLN / SDN.
    - 5) Ventfabrics: Ventglas.
    - 6) Ductmate: ProFlex.
- 3. Duct Access Doors:
  - a. General:
    - 1) Factory built insulated access door with hinges and sash locks, as necessary. Construction shall be galvanized sheet metal, **24 ga (0.635 mm)** minimum.
    - 2) Fire and smoke damper access doors shall have minimum clear opening of **12 inches (300 mm)** square or larger as shown on Drawings.
  - b. Rectangular Ducts:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Air Balance: Fire/Seal FSA 100.
      - b) Air-Rite: Model HAD-2.
      - c) Cesco: HDD.
      - d) Elgen: TAB Type / Hinge and Cam.
      - e) Flexmaster: Spin Door.
      - f) Kees: ADH-D.
      - g) Nailor: 08SH.
      - h) Pottorff: 60-HAD.
      - i) Ruskin: ADH-24.
      - j) United Enertech: L-95.
- 4. Dampers And Damper Accessories:
  - a. Locking Quadrant Damper Regulators:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Duro Dyne: KS-385.
      - b) Dyn Air: QPS-385.
      - c) Elgen: EQR-4.
      - d) Ventfabrics: Ventline 555.
      - e) Young: No. 1.
  - b. Concealed Ceiling Damper Regulators:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Cain.
      - b) Duro Dyne.

- c) Elgen.
- d) Metco Inc.
- e) Ventfabrics: 666 Ventlok.
- f) Young: 301.
- c. Volume Dampers:
  - 1) Rectangular Duct:
    - a) Factory-manufactured 16 ga (1.6 mm) galvanized steel, single blade and opposed blade type with 3/8 inch (9.5 mm) axles and end bearings. Blade width 8 inches (200 mm) maximum. Blades shall have 1/8 inch (3 mm) clearance all around.
    - b) Damper shall operate within acoustical duct liner.
    - c) Provide channel spacer equal to thickness of duct liner.
    - d) Dampers above removable ceiling and in Mechanical Rooms shall have locking quadrant on bottom or side of duct. Otherwise, furnish with concealed ceiling damper regulator and cover plate.
    - e) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) Air-Rite: Model CD-2.
      - (2) American Warming: VC-2-AA.
      - (3) Arrow: OBDAF-207.
      - (4) C & S: AC40.
      - (5) Cesco: AGO.
      - (6) Daniel: CD-OB.
      - (7) Greenheck: VCD-20.
      - (8) Nailor: 1810 or 1820.
      - (9) Pottorff: CD-42.
      - (10) Ruskin: MD-35.
      - (11) United Enertech: MD-115.
      - (12) Utemp: CD-OB.
- d. Motorized Outside Air Dampers:
  - 1) General:
    - a) Low leakage type. AMCA certified.
    - b) Make provision for damper actuators and actuator linkages to be mounted external of air flow.
  - 2) Rectangular Ducts:
    - a) Damper Blades:
      - (1) Steel or aluminum airfoil type with mechanically locked blade seals, 8 inch (200 mm) blade width maximum measured perpendicular to axis of damper.
      - (2) Jamb seals shall be flexible metal compression type.
      - (3) Opposed or single blade type.
    - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) Air Balance: AC 526.
      - (2) American Warming: AC526.
      - (3) Arrow: AFD-20.
      - (4) C & S: AC50.
      - (5) Cesco: AGO3.
      - (6) Nailor: 2020.
      - (7) Pottorff: CD-52.
      - (8) Ruskin: CD-60.
      - (9) Tamco: Series 1000.
      - (10) United Enertech: CD-150 or CD-160.
- e. Backdraft Dampers:
  - 1) Backdraft blades shall be nonmetallic neoprene coated fiberglass type.
  - 2) Stop shall be galvanized steel screen or expanded metal, 1/2 inch (13 mm) mesh.
  - 3) Frame shall be galvanized steel or extruded aluminum alloy.
  - 4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Air-Rite: Model BDD-3.
    - b) American Warming: BD-15.
    - c) C & S: BD30.
    - d) Pottorff: BD-51.

- e) Ruskin: NMS2.
  - f) Utemp: BFEA.
5. Air Turns:
- a. Single thickness vanes. Double thickness vanes not acceptable.
  - b. 4-1/2 inch (115 mm) wide vane rail. Junior vane rail not acceptable.

C. Fabrication:

- 1. Duct Liner:
  - a. Install mat finish surface on airstream side. Secure insulation to cleaned sheet metal duct with continuous 100 percent coat of adhesive and with 3/4 inch (19 mm) long mechanical fasteners 12 inches (300 mm) on center maximum unless detailed otherwise on Drawings. Pin all duct liner.
  - b. Accurately cut liner and thoroughly coat ends with adhesive. Butt joints tightly. Top and bottom sections of insulation shall overlap sides. If liner is all one piece, folded corners shall be tight against metal. Ends shall butt tightly together.
  - c. Coat longitudinal and transverse edges of liner with adhesive.
- 2. Air Turns:
  - a. Permanently install vanes arranged to permit air to make abrupt turn without appreciable turbulence, in 90 degree elbows of above ground supply and return ductwork.
  - b. Quiet and free from vibration when system is in operation.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Duct Liner:

- 1. Furnish and install acoustic lining in following types of rectangular ducts unless noted otherwise on Contract Documents:
  - a. Supply air.
  - b. Return air.
  - c. Mixed air.
  - d. Transfer air.
  - e. Relief air.
  - f. Elbows, fittings, and diffuser drops greater than 12 inches (300 mm) in length.

B. Flexible Connections: Install flexible inlet and outlet duct connections to each furnace.

C. Access Doors In Ducts:

- 1. Install at each manual outside air damper and at each motorized damper. Locate doors within 6 inches (150 mm) of installed dampers.
- 2. Install within 6 inches (150 mm) of fire dampers and in Mechanical Room if possible. Install on side of duct that allows easiest access to damper.

D. Dampers And Damper Accessories:

- 1. Install concealed ceiling damper regulators.
  - a. Paint cover plates to match ceiling tile.
  - b. Do not install damper regulators for dampers located directly above removable ceilings or in Mechanical Rooms.
- 2. Provide each take-off with an adjustable volume damper to balance that branch.
  - a. Anchor dampers securely to duct.
  - b. Install dampers in main ducts within insulation.
  - c. Dampers in branch ducts shall fit against sheet metal walls, bottom and top of duct, and be securely fastened. Cut duct liner to allow damper to fit against sheet metal.
  - d. Where concealed ceiling damper regulators are installed, provide cover plate.
- 3. Install motorized dampers.

**END OF SECTION**

**SECTION 23 4100****AIR FILTERS****PART 1 - GENERAL****1.1 SUMMARY**

A. Includes But Not Limited To:

1. Furnish and install filters used in mechanical equipment.

B. Related Requirements:

1. Section 23 3001: 'Common Duct Requirements'.
2. Section 23 5417: 'Gas-Fired Furnaces'.

**PART 2 - PRODUCTS****2.1 MANUFACTURED UNITS**

A. Furnace Filters: **One inch (25 mm)** thick throw-away type as recommended by Furnace Manufacturer.

**PART 3 - EXECUTION****3.1 INSTALLATION**

A. Provide ample access for filter removal.

**3.2 FIELD QUALITY CONTROL**

A. Inspection: At date of Substantial Completion, air filters shall be new, clean, and approved by Owner's representative.

**END OF SECTION**

**SECTION 23 5135****AIR PIPING****PART 1 - GENERAL****1.1 SUMMARY**

## A. Includes But Not Limited To:

1. Furnish and install heating equipment exhaust piping and combustion air intake piping as described in Contract Documents.

## B. Related Requirements:

1. Section 07 6310: 'Steep Slope Roof Flashing: Asphalt Tile' for pipe flashing used on steep slope asphalt tile roofs only.
2. Sections Under 09 9000 Heading: Painting.
3. Section 23 0501: 'Common HVAC Requirements'.
4. Section 23 5417: 'Gas-Fired Furnaces'.

**1.2 REFERENCES**

## A. Reference Standards:

1. ASTM International:
  - a. ASTM D1785-12, 'Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120'.
  - b. ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
  - c. ASTM D2661-11, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings'.
  - d. ASTM D2665-14, 'Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings'.

**PART 2 - PRODUCTS****2.1 ASSEMBLIES**

## A. Manufacturers:

1. Manufacturer Contact List:
  - a. Armaflex by Armacell, Mebane, NC [www.armaflex.com](http://www.armaflex.com).
  - b. Nomaco, Youngsville, NC [www.nomacokflex.com](http://www.nomacokflex.com).

## B. Materials:

1. Air Piping: Schedule 40 pipe and fittings meeting requirements of ASTM D1785, ASTM D2661, or ASTM D2665.
2. Solvent Cement and Adhesive Primer:
  - a. Use PVC solvent cement that has a VOC content of 510 g/L or less if required by local AHJ if required.
  - b. Use adhesive primer that has a VOC content of 550 g/L or less if required by local AHJ if required.
  - c. Meet requirements of ASTM F656 for cement primer and ASTM D2564 for pipe cement.

**PART 3 - EXECUTION****3.1 INSTALLATION****A. Installation For Condensing Furnaces:**

1. Run individual vent and individual combustion intake piping from each furnace to concentric roof termination kit provided by Furnace Manufacturer. Slope lines downward toward furnace.
2. Slope combustion chamber drain downward to funnel drain. Anchor to wall with wall clamps, allowing free movement through clamp for expansion.
3. Use concentric roof termination kit provided by Furnace Manufacturer. Install vent and combustion air intake piping at clearance and distances required by Furnace Manufacturer.
4. Attach factory-supplied neoprene coupling to combustion-air inlet connection and secure with clamp.
5. Ensure that factory-supplied perforated metal disc is installed in flexible coupling, unless its removal is required.
6. York Furnaces: Install air piping on side of furnace in horizontal or vertical installation.

**B. Support:**

1. Support concentric roof termination kit at ceiling or roof line with 20 ga (0.912 mm) sheet metal straps as detailed on Drawings.
2. Support horizontal and sloping sections of pipe with 1 inch (25 mm) wide 20 ga (1.0058 mm) galvanized steel straps. Anchor securely to structure, not allowing pipe to sway.

**END OF SECTION**

**SECTION 23 5417**

**GAS-FIRED FURNACES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Includes But Not Limited To:

- 1. Furnish and install horizontal/vertical gas-fired condensing furnaces as described in Contract Documents.

B. Related Sections:

- 1. Section 23 0501: 'Common HVAC Requirements'.
- 2. Section 23 1123: 'Facility Natural Gas Piping'.
- 3. Section 23 2300: 'Refrigerant Piping'.
- 4. Section 23 4100: 'Air Filters'.
- 5. Section 23 5135: 'Air Piping'.
- 6. Section 23 6214: 'Compressor Units: Air Conditioning (5 Ton or less)' for DX Cooling.

**1.2 SUBMITTALS**

A. Informational Submittals:

- 1. Manufacturer Reports: Equipment check-out sheets.

B. Special Procedure Submittals:

- 1. Installer must register with Manufacturer before submitting Manufacturer Warranty:
  - a. Installer to contact Owner's Representative (FM Group or Project Manager) for following MANDATORY information to be given to Manufacturer before Manufacturer will issue Manufacturer's 'Special LDS Warranty' included with Closing Submittal:
    - 1) This must be given to Manufacturer:
      - a) Name of Owner (name of FM Group) \_\_\_\_\_
      - b) Mailing Address (FM office address) \_\_\_\_\_
      - c) Building Property ID (unique 7-digit identifier) \_\_\_\_\_
      - d) Project site address: \_\_\_\_\_
      - e) Model Number of each Unit \_\_\_\_\_
      - f) Serial Number of each Unit \_\_\_\_\_
      - g) Date of Installation / Startup \_\_\_\_\_
  - b. Product Data for Prerequisite EQ 1:
    - 1) Documentation indicating that units comply with ANSI/ASHRAE 62.1, Section 5 - 'Systems and Equipment'.
  - c. Product Data for Credit EQ 4.1:
    - 1) For solvent cements and adhesive primers, including printed statement of VOC content.

C. Closeout Submittals:

- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Warranty Documentation:
    - 1) Final, executed copy of Manufacturer's 'Special LDS Warranty' including required Owner / Manufacturer mandatory information.
  - b. Record Documentation:
    - 1) Manufacturers Documentation:
      - a) Equipment checkout sheet: Complete and sign all items for each unit.

### 1.3 WARRANTY

#### A. Manufacturer's Warranty:

1. Provide Manufacturer's 'Special LDS Warranty' for the following:
  - a. Provide fifteen (15) year minimum limited warranty of heat exchanger.
  - b. Provide five (5) year limited warranty on parts.

## PART 2 - PRODUCTS

### 2.1 ASSEMBLIES

#### A. Manufacturers:

1. Manufacturer Contact List:
  - a. Carrier Corporation:
    - 1) Carrier National: Bradley Brunner (270) 282-1241 [Bradley.M.Brunner@Carrier.com](mailto:Bradley.M.Brunner@Carrier.com).
    - 2) Carrier Utah: Bret Adams (Contractors Heating/Cooling Supply) (801) 224-1020 ext. 2527 [bret.adams@mc.supply](mailto:bret.adams@mc.supply)
  - b. Lennox Industries:
    - 1) For pricing and information contact: Lennox Mountain Commercial @ 1-800-972-3283.
    - 2) Lennox National Contact: Jeff Barrett (801) 556-6114 [jeff.barrett@lennoxind.com](mailto:jeff.barrett@lennoxind.com)
  - c. York (US Air Conditioning Distributors):
    - 1) Nick Filimoehala (801) 463-5323 [n.filimoehala@us-ac.com](mailto:n.filimoehala@us-ac.com).

#### B. Design Criteria:

1. Rated at 92 percent minimum AFUE (Annual Fuel Utilization Efficiency) calculated in accordance with DOE test procedures.

#### C. Manufactured Units:

1. Furnaces:
  - a. Factory assembled units certified by AGA complete with blower section, furnace section, steel casing, piped, and wired.
  - b. Blower section shall consist of cabinet, blower, and motor.
    - 1) Cabinet shall be of 22 ga (0.8 mm) minimum cold rolled steel and have finish coat of baked-on enamel.
    - 2) Blower shall be Class 1, full DIDW, statically and dynamically balanced.
  - c. Automatic controls shall consist of:
    - 1) Manual gas shut-off valve.
    - 2) Operating automatic gas valve.
    - 3) Solid-state type fan and thermal limit controls.
    - 4) 24-volt transformer.
    - 5) Hot surface ignition system.
  - d. Blower shall be driven by multi-speed direct driven motor.
  - e. Furnace section shall be enclosed in 22 ga (0.8 mm) minimum enameled steel casing lined with foil covered insulation.
  - f. Heat Exchanger: Aluminized steel.
  - g. Gas Burners: Aluminized steel.
  - h. PVC intake of outside air and PVC combustion product exhaust, with sealed combustion, direct vent system.
  - i. Concentric roof termination kit for roof mounting.
  - j. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Standard Furnaces:
      - a) Carrier: 59SC5B.
      - b) Lennox: ML196E
      - c) York: TM9E
    - 2) Two Stage Heat with ECM motor:
      - a) Carrier: 59TN6.
      - b) Lennox: ML296V.

- c) York: TM9V.
- 2. Cooling Coil:
  - a. Cooling coil shall consist of heavy gauge steel cabinet with baked-on enamel finish to match furnace:
    - 1) Coil shall have aluminum fins bonded to seamless copper or aluminum tubing.
    - 2) Coil shall be ARI rated. Provide drain pans with connections at one end.
    - 3) Use thermal expansion valve.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Vertical:
      - a) Carrier: CNPVP.
      - b) Lennox: CX35.
      - c) York: CF.

## 2.2 ACCESSORIES

### A. Filter Frame:

- 1. Build filter frame external to furnace as detailed on Contract Drawings.

### B. Vibration Isolators:

- 1. Vertical Installation: 4 inches (100 mm) square by 1/2 inch (13 mm) thick minimum neoprene type vibration isolation pads.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

#### A. Vibration Isolators:

- 1. Install vibration isolator on each hanger rod supporting horizontal furnace and under each corner of vertical furnace.

### 3.2 FIELD QUALITY CONTROL

#### A. Manufacturer Services:

- 1. Furnace installer shall:
  - a. Verify proper gas orifice size.
  - b. Clock gas meter for rated input.
  - c. Verify and set gas pressure at furnace.
  - d. Check and measure temperature rise.
  - e. Check safety controls for proper operation.
  - f. Check combustion vent sizes and combustion air sizes.
- 2. In addition, furnace installer shall start up, check out, and adjust furnaces using equipment check-out sheet provided by Manufacturer. Complete and sign all items on sheet.

**END OF SECTION**

**SECTION 23 6214****COMPRESSOR UNITS: Air Conditioning (5 Ton or less)****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install compressor units as described in contract documents.
- B. Related Sections:
  - 1. Section 23 0501: 'Common HVAC Requirements'.
  - 2. Section 23 2300: 'Refrigerant Piping'.
  - 3. Section 23 5417: 'Gas-Fired Furnaces'.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Compressor: Pump that increases vapor (refrigerant or air) pressure from one level to a higher level of pressure.
  - 2. Compressor Unit: Outside section of an air conditioning system which pumps vaporized refrigerant from the evaporator, compresses it, liquefies it in the condenser and returns it to the evaporator coil. The outdoor portion of a split system air conditioner contains the compressor and outdoor coil.
  - 3. Condenser: Device used to condense refrigerant in a cooling system.
  - 4. Condenser Coils: In a compressor unit, the coil dissipates heat from the refrigerant, changing the refrigerant from vapor to liquid.
  - 5. Refrigerant: Absorbs heat by a change of state (evaporation) from liquid to a gas, and releases heat by a change of state (condenses) from gas back to a liquid.
  - 6. SEER (Seasonal Energy Efficiency Ratio): Measure of cooling efficiency for air conditioners and heat pumps. A ratio of total cooling in comparison to electrical energy input in watts per hour. Higher the seer, the more energy efficient the unit. Since 2006, the minimum SEER required by the Department of Energy is 13.00 and 15.00+ SEER is considered high efficiency.
  - 7. Split System: Combination of an outdoor unit (air conditioner or heat pump) with an indoor unit (furnace or air handler). Split systems must be matched for optimum efficiency.
- B. Reference Standards:
  - 1. Air-Conditioning, Heating, and Refrigeration Institute:
    - a. AHRI Standard 210/240-2017, 'Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment' (formerly ARI Standard 210/240).
  - 2. American National Standards Institute / American Society of Heating, Refrigerating and Air-Conditioning Engineers:
    - a. ANSI/ASHRAE 15-2016 and 34-2016, 'Safety Standard and Designation and Classification of Refrigerants'.

**1.3 SUBMITTALS**

- A. Action Submittals:
- B. Informational Submittals:
  - 1. Tests and Evaluation Reports:
    - a. Manufacturer Reports: Equipment check-out sheets.

- C. Special Procedure Submittals:
  - 1. Installer must register with Manufacturer before submitting Manufacturer Warranty:
    - a. Installer to contact Owner’s Representative (FM Group or Project Manager) for following MANDATORY information to be given to Manufacturer before Manufacturer will issue Manufacturer’s ‘Special Church Warranty’ included with Closing Submittal:
      - 1) This must be given to Manufacturer:
        - a) Name of Owner (name of FM Group) \_\_\_\_\_
        - b) Mailing Address (FM office address) \_\_\_\_\_
        - c) Building Property ID (unique 7 digit identifier) \_\_\_\_\_
        - d) Project site address: \_\_\_\_\_
        - e) Model Number of each Unit \_\_\_\_\_
        - f) Serial Number of each Unit \_\_\_\_\_
        - g) Date of Installation / Startup \_\_\_\_\_
  - 2. Qualification Statements:
    - a. Technician certificate for use in HFC and HCFC refrigerants.
- D. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Manufacturer’s ‘Special Church Warranty’ including required Owner / Manufacturer mandatory information.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Equipment checkout sheet: Complete and sign all items for each unit.

**1.4 QUALITY ASSURANCE**

- A. Regulatory Agency Sustainability Approvals:
  - 1. Each unit shall be UL / ULC or ETL labeled.
  - 2. Comply with ANSI/AHRI Standard 210/240.
  - 3. Refrigeration compressor, coils, and specialties shall be designed to operate with CFC-free refrigerants.
- B. Qualifications. Section 01 4301 applies, but is not limited to the following:
  - 1. Installer: Refrigerant piping shall be installed by refrigeration contractor licensed by State and by technicians certified in use of HFC and HCFC refrigerants.

**1.5 WARRANTY**

- A. Manufacturer’s Warranty:
  - 1. Provide Manufacturer’s ‘Special Church Warranty’ for the following:
    - a. Provide ten (10) year limited warranty on compressor.
    - b. Provide five (5) year limited warranty on parts from date of ‘start-up’.

**PART 2 - PRODUCTS**

**2.1 ASSEMBLIES**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Air-Rite Manufacturing, Bountiful, UT [www.air-ritemfg.com](http://www.air-ritemfg.com).
      - 1) Blair Halverson (801) 295-2529.
    - b. Carrier Corporation:
      - 1) Carrier National: Bradley Brunner (270) 282-1241 [Bradley.M.Brunner@Carrier.com](mailto:Bradley.M.Brunner@Carrier.com).

- 2) Carrier Utah: Bret Adams ([Contractors Heating/Cooling Supply](#)) (801) 224-1020 ext. 2527 [bret.adams@mc.supply](mailto:bret.adams@mc.supply).
  - c. Lennox Industries:
    - 1) For pricing and information call Lennox Mountain Commercial at (800) 972-3283.
    - 2) Lennox National Contact: Jeff Barrett (801) 556-6114 [jeff.barrett@lennoxind.com](mailto:jeff.barrett@lennoxind.com).
  - d. York (US Air Conditioning Distributors):
    - 1) Nick Filimoehala (801) 463-5323 [n.filimoehala@us-ac.com](mailto:n.filimoehala@us-ac.com).
- B. Performance:
- 1. Capacities: SEER rating as defined by AHRI shall be 13.0 or greater.
- C. Manufactured Units:
- 1. Compressor Units (5 Tons or Less):
    - a. General:
      - 1) Units shall be operable down to 0 deg F (minus 18 deg C) outdoor temperature.
      - 2) Use R-410a refrigerant.
      - 3) Only one liquid line, one suction line, and one power connection shall be made to each compressor. Provide charging valves.
    - b. Condenser Coils:
      - 1) Aluminum plate fins mechanically bonded to seamless copper tubes or 'Spine Fin' trade mark system which has aluminum fins epoxy bonded to aluminum tubes or micro-channel.
      - 2) Provide stamped louver coil guard for unit.
    - c. Fans:
      - 1) Direct driven propeller type.
      - 2) Fan motor shall be single or two speed, thermostatically controlled, permanently lubricated, and designed with permanent protection.
      - 3) Motors shall be resiliently mounted.
      - 4) Each fan shall have a safety guard.
    - d. Compressor:
      - 1) Each condenser unit shall have only one compressor.
      - 2) Design with following features:
        - a) Externally mounted brass service valves with charging connections.
        - b) Crankcase heater.
        - c) Resilient rubber mounts.
        - d) Compressor motor-overload protection.
        - e) Single speed.
    - e. Controls:
      - 1) Factory wired and located in separate enclosure.
      - 2) Following three paragraphs may not be factory installed and will therefore have to be field installed.
      - 3) Safety devices:
        - a) High and low pressure cutout.
        - b) Condenser fan motor-overload devices.
      - 4) Anti-cycle timers to prevent units from starting up again for five minutes after any power interruption.
      - 5) Head pressure type low ambient kit.
    - f. Casing:
      - 1) Fully weatherproof for outdoor installation. Finish shall be weather resistant.
    - g. Openings shall be provided for power and refrigerant connections.
    - h. Panels shall be removable for servicing.
    - i. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) North Region:
        - a) Carrier: 24ABB3.
        - b) Lennox: 13ACXN.
        - c) York: YCD.
      - 2) Southeast Region:
        - a) Carrier: 24ACC4.
        - b) Lennox: 14ACX.
        - c) York: YCE.

- 3) Southwest Region:
  - a) Carrier: 24AAA5.
  - b) Lennox: 14ACX.
  - c) York: YCS.

## 2.2 ACCESSORIES

### A. Vibration Isolators:

1. 4 inches (100 mm) square by 3/4 inch (19 mm) thick minimum neoprene type vibration isolation pads.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

#### A. Verification Of Conditions:

1. Verify blocking installed under roof decking is in correct location to attach 'compressor unit curb'.
2. Notify Architect of unsuitable conditions in writing
3. Commencement of Work by Installer is considered acceptance of substrate.

### 3.2 INSTALLATION

#### A. General:

1. Set compressor units level on concrete slab on vibration isolation pads located at each corner of unit. This does not apply to compressor units that have composite non-metal bottom.
2. Compressor unit to be anchored solidly to concrete slab.
3. Do not use capillary tube and piston type refrigerant metering devices.

### 3.3 FIELD QUALITY CONTROL

#### A. Manufacturer Services:

1. Compressor units shall be started up, checked out, and adjusted by compressor unit Installer.
2. Use equipment checkout sheet provided by Manufacturer:
  - a. Complete and sign all items on sheet.

**END OF SECTION**

**DIVISION 26: ELECTRICAL**

**26 0500 COMMON WORK RESULTS FOR ELECTRICAL**

- 26 0501 COMMON ELECTRICAL REQUIREMENTS
- 26 0519 LINE-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
- 26 0533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

**26 2000 LOW-VOLTAGE ELECTRICAL TRANSMISSION**

- 26 2417 CIRCUIT BREAKER PANELBOARDS
- 26 2726 WIRING DEVICES
- 26 2816 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

END OF TABLE OF CONTENTS

**SECTION 26 0501****COMMON ELECTRICAL REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. General electrical system requirements and procedures.
  - 2. Perform excavating and backfilling work required by work of this Division as described in Contract Documents.
  - 3. Make electrical connections to equipment provided under other Sections.
  - 4. Furnish and install Penetration Firestop Systems at electrical system penetrations as described in Contract Documents.
  
- B. Products Furnished But Not Installed Under This Section:
  - 1. Anchor bolts and templates for exterior lighting equipment bases.
  
- C. Related Requirements:
  - 1. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. National Fire Protection Association / American National Standards Institute:
    - a. NFPA 70, 'National Electrical Code (NEC)' (2017 or most recent edition adopted by AHJ).
  - 2. National Electrical Manufacturing Association Standards (NEMA):
    - a. NEMA 250-2018, 'Enclosure for Electrical Equipment (1000 Volts Maximum)'.

**1.3 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Provide following information for each item of equipment:
      - 1) Catalog Sheets.
      - 2) Assembly details or dimension drawings.
      - 3) Installation instructions.
      - 4) Manufacturer's name and catalog number.
      - 5) Name of local supplier.
    - b. Furnish such information for following equipment:
      - 1) Section 26 2816: 'Enclosed Switches And Circuit Breakers'.
    - c. Do not purchase equipment before approval of product data.
  - 2. Shop Drawings:
    - a. Submit on Panelboards:
    - b. Indicate precise equipment to be used, including all options specified. Indicate wording and format of nameplates where applicable. Submit in three-ring binder with hard cover.
  
- B. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. Report of site tests, before Substantial Completion.
  - 2. Qualification Statement:

- a. Electrical Subcontractor:
    - 1) Provide Qualification documentation if requested by Architect or Owner.
  - b. Installer:
    - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Provide operating and maintenance instructions for each item of equipment submitted under Product Data.
    - b. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature.
        - b) Include copy of approved shop drawings.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
- 1. NEC and local ordinances and regulations shall govern unless more stringent requirements are specified.
  - 2. Material and equipment provided shall meet standards of NEMA or UL and bear their label wherever standards have been established and label service is available.
  - 3. Material and equipment provided shall meet standards of NEMA or UL, or ULC, CSA, or EEMAC and bear their label wherever standards have been established and label service is available.
- B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
- 1. Electrical Subcontractor:
    - a. Company specializing in performing work of this section.
      - 1) Minimum five (5) years experience in electrical installations.
      - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
    - b. Upon request, submit documentation.
  - 2. Installer:
    - a. Licensed for area of Project.
    - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
    - c. Upon request, submit documentation.

### PART 2 - PRODUCTS

#### 2.1 SYSTEMS

- A. Performance:
- 1. Design Criteria:
    - a. Materials and equipment provided under following Sections shall be by same Manufacturer:
      - 1) Section 26 2417: Panelboards.
      - 2) Section 26 2816: Enclosed Switches And Circuit Breakers.

### PART 3 - EXECUTION

#### 3.1 INSTALLERS

- A. Acceptable Installers:
- 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

### **3.2 EXAMINATION**

- A. Verification Of Conditions:
1. Confirm dimensions, ratings, and specifications of equipment to be installed and coordinate these with site dimensions and with other Sections.

### **3.3 INSTALLATION**

- A. General:
1. Locations of electrical equipment shown on Drawings are approximate only. Field verify actual locations for proper installation.
  2. Coordinate electrical equipment locations and conduit runs with those providing equipment to be served before installation or rough in.
    - a. Notify Architect of conflicts before beginning work.
    - b. Coordinate locations of power and lighting outlets in mechanical rooms and other areas with mechanical equipment, piping, ductwork, cabinets, etc, so they will be readily accessible and functional.
  3. Work related to other trades which is required under this Division, such as cutting and patching, trenching, and backfilling, shall be performed according to standards specified in applicable Sections.
- B. Install Penetration Firestop System appropriate for penetration at electrical system penetrations through walls, ceilings, and top plates of walls.

### **3.4 FIELD QUALITY CONTROL**

- A. Field Tests:
1. Test systems and demonstrate equipment as working and operating properly. Notify Architect before test. Rectify defects at no additional cost to Owner.
  2. Measure current for each phase of each motor under actual final load operation, i.e. after air balance is completed for fan units, etc. Record this information along with full-load nameplate current rating and size of thermal overload unit installed for each motor.

### **3.5 CLOSEOUT ACTIVITIES**

- A. Training:
1. Provide competent instructor for three (3) days to train Owner's maintenance personnel in operation and maintenance of electrical equipment and systems. Factory representatives shall assist this instruction as necessary. Schedule instruction period at time of final inspection.

**END OF SECTION**

**SECTION 26 0519****LINE-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Quality of conductors used on Project except as excluded below.
- B. Related Requirements:
  - 1. Section 23 0933: 'Electric and Electronic Control System for HVAC' for conductors and cables for temperature control system.
  - 2. Section 26 0501: 'Common Electrical Requirements'.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Line Voltage: Over 70 Volts.
- B. Reference Standards:
  - 1. National Fire Protection Association:
    - a. NFPA 70, 'National Electric Code (NEC)' (2017 or most recent edition adopted by AHJ including all applicable amendments and supplements).
      - 1) Article 334, "Nonmetallic-Sheathed Cable, Types NM, NMC And NMS'.

**PART 2 - PRODUCTS****2.1 SYSTEMS**

- A. Line Voltage Conductors:
  - 1. Copper with AWG sizes as shown:
    - a. Minimum size shall be No. 12 except where specified otherwise.
    - b. Conductor size No. 8 and larger shall be stranded.
  - 2. Insulation:
    - a. Standard Conductor Size No. 10 And Smaller: 600V type THWN or XHHW (75 deg F (24 deg C)).
    - b. Standard Conductor Size No. 8 And Larger: 600V Type THW, THWN, or XHHW (75 deg F (24 deg C)).
    - c. Higher temperature insulation as required by NFPA 70 or local codes.
  - 3. Colors:
    - a. 208Y / 120 V System:
      - 1) Black: Phase A.
      - 2) Red: Phase B.
      - 3) Blue: Phase C.
      - 4) Green: Ground.
      - 5) White: Neutral.
    - b. 480Y / 277 Volt System:
      - 1) Brown: Phase A.
      - 2) Orange: Phase B.
      - 3) Yellow: Phase C.
      - 4) Gray: Neutral.
      - 5) Green: Ground.

- c. Conductors size No. 10 and smaller shall be colored full length. Tagging or other methods for coding of conductors size No. 10 and smaller not allowed.
  - d. For feeder conductors larger than No. 10 at pull boxes, gutters, and panels, use painted or taped band or color tag color-coded as specified above.
- B. Line Voltage Cables:
1. Non-Metallic Sheathed Cable (NM) and Metal Clad Cable (MC) may be used as restricted below:
    - a. Copper conductors.
    - b. Sizes #12 through #8.
    - c. Use only in indoor dry locations where:
      - 1) Not subject to damage.
      - 2) Not in contact with earth.
    - d. Not in concrete.
    - e. Not where exposed or not concealed.
    - f. Not over suspended ceilings.
    - g. As restricted by NFPA 70 Article 334.
  2. Metal Clad Cable (MC) may be used as restricted below:
    - a. Copper conductors.
    - b. Sizes #12 through #8.
    - c. Use only in indoor dry locations where:
      - 1) Not subject to damage.
      - 2) Not in contact with earth.
      - 3) Not in concrete.
- C. Standard Connectors:
1. Conductors No. 8 And Smaller: Steel spring wire connectors.
  2. Conductors Larger Than No. 8: Pressure type terminal lugs.
  3. Connections Outside Building: Watertight steel spring wire connections with waterproof, non-hardening sealant.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. General:
1. Conductors and cables shall be continuous from outlet to outlet.
  2. Do not use direct burial cable.
- B. Line Voltage Conductors:
1. Install conductors in raceway where indicated on Contract Drawings. Run conductors of different voltage systems in separate conduits.
  2. Route circuits at own discretion, however, circuiting shall be as shown in Panel Schedules. Group circuit homeruns to panels as shown on Contract Drawings.
  3. Neutrals:
    - a. On three-phase, 4-wire systems, do not use common neutral for more than three circuits.
    - b. On single-phase, 3-wire systems, do not use common neutral for more than two circuits.
    - c. Run separate neutrals for each circuit where specifically noted on Contract Drawings.
    - d. Where common neutral is run for two or three home run circuits, connect phase conductors to breakers in panel which are attached to separate phase legs:
      - 1) Provide breaker tie so that all circuits that share common neutral are simultaneously disconnected.
      - 2) Neutral conductors shall be of same size as phase conductors unless specifically noted otherwise.
  4. Pulling Conductors:

- a. Do not pull conductors into conduit until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
  - b. Do not use heavy mechanical means for pulling conductors.
  - c. Use only listed wire pulling lubricants.
- C. Line Voltage Cables:
1. Route circuits at own discretion, however, circuiting and numbering shall be as shown in Panel Schedules.
  2. Support cables using approved staples, cable ties, straps, hangers, or similar fittings, spaced as required.
  3. Where installing in framing, do not bore holes in joists or beams outside center 1/3 of member depth or within **24 inches (600 mm)** of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width. Holes shall be one inch diameter maximum.
  4. Conceal cables within ceilings and walls of finished areas. Cables may be exposed in unfinished areas but not run on floors of mechanical equipment spaces or in such a way that they obstruct access to, operation of, or servicing of equipment.
  5. Install exposed cables parallel to or at right angles to building structure lines.
  6. Keep cables **6 inches (150 mm)** minimum from hot water pipes.
  7. Do not support cables from mechanical ducts or duct supports without Architect's written approval.
  8. Prohibited procedures:
    - a. Boring holes for installation of cables in vertical truss members.
    - b. Notching of structural members for installation of cables.

**END OF SECTION**

**SECTION 26 0533****RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Quality of material and installation procedures for raceway, boxes, and fittings used on Project but furnished under other Divisions.
  - 2. Furnish and install raceway, conduit, and boxes used on Project not specified to be installed under other Divisions.
  
- B. Related Requirements:
  - 1. See Section 07 8400: 'Firestopping' for raceways penetrating fire rated walls, ceilings, and barriers'.
  - 2. Section 23 0933: 'Electric and Electronic Control System for HVAC' for concealed raceway and extensions for temperature control system.
  - 3. Section 26 0501: 'Common Electrical Requirements' for general electrical requirements'.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. National Fire Protection Association:
    - a. NFPA 70, 'National Electric Code (NEC)' (2017 or most recent edition adopted by AHJ including all applicable amendments and supplements).

**PART 2 - PRODUCTS****2.1 SYSTEM**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Cooper B-Line, Highland, IL [www.b-line.com](http://www.b-line.com).
    - b. Hubbell Incorporated, Milford, CT [www.hubbell-wiring.com](http://www.hubbell-wiring.com) or Hubbell Canada Inc, Pickering, ON (905) 839-4332.
    - c. Square D, Palatine, IL [www.squared.com](http://www.squared.com).
    - d. Thomas & Betts, Memphis, TN [www.tnb.com](http://www.tnb.com) or Thomas & Betts Ltd, Iberville, PQ (450) 347-5318.
    - e. Walker Systems Inc, Williamstown, WV (800) 240-2601 or Walker Systems Inc / Wiremold Canada Inc, Fergus, ON (519) 843-4332.
    - f. Wiremold Co, West Hartford, CT [www.wiremold.com](http://www.wiremold.com).
  
- B. Materials:
  - 1. Raceway And Conduit:
    - a. **Sizes:**
      - 1) **3/4 inch (19 mm)** for exterior use, unless indicated otherwise.
      - 2) **1/2 inch (13 mm)** for interior use, unless indicated otherwise.
    - b. Types: Usage of each type is restricted as specified below by product.
      - 1) Galvanized rigid steel or galvanized intermediate metal conduit (IMC) is allowed for use in all areas. Where in contact with earth or concrete, wrap buried galvanized rigid steel and galvanized IMC conduit and fittings completely with vinyl tape.

- 2) Galvanized Electrical Metallic Tubing (EMT), Flexible Steel Conduit, and Electrical Non-Metallic Tubing (ENT):
    - a) Allowed for use only in indoor dry locations where it is:
      - (1) Not subject to damage.
      - (2) Not in contact with earth.
      - (3) Not in concrete.
    - b) For metal conduit systems, flexible steel conduit is required for final connections to indoor mechanical equipment.
  - 3) Galvanized Electrical Metallic Tubing (EMT) and Flexible Steel Conduit:
    - a) Allowed for use only in indoor dry locations where it is:
      - (1) Not subject to damage.
      - (2) Not in contact with earth.
      - (3) Not in concrete.
    - b) For metal conduit systems, flexible steel conduit is required for final connections to indoor mechanical equipment.
  - 4) Schedule 40 Polyvinyl Chloride (PVC) Conduit:
    - a) Allowed for use only underground or below concrete with galvanized rigid steel or IMC elbows and risers.
  - 5) Listed, Liquid-Tight Flexible Metal Conduit:
    - a) Use in outdoor final connections to mechanical equipment, length not to exceed **36 inches (900 mm)**.
  - 6) Pre-wired **3/8 Inch (9.5 mm)** Flexible Fixture Whips: Allowed only for connection to recessed lighting fixtures, lengths not to exceed **72 inches (1 800 mm)**.
- c. Prohibited Raceway Materials:
- 1) Aluminum conduit.
  - 2) Armored cable type AC (BX) cable.
2. Raceway And Conduit:
- a. **Sizes:**
- 1) **3/4 inch (19 mm)** for exterior use, unless indicated otherwise.
  - 2) **1/2 inch (13 mm)** for interior use, unless indicated otherwise.
- b. **Types:** Usage of each type is restricted as specified below by product.
- 1) Galvanized rigid steel or galvanized intermediate metal conduit (IMC) is allowed for use in all areas. Where in contact with earth or concrete, wrap buried galvanized rigid steel and galvanized IMC conduit and fittings completely with vinyl tape.
  - 2) Galvanized Electrical Metallic Tubing (EMT), Flexible Steel Conduit, and Metal Clad Cable (MC):
    - a) Allowed for use only in indoor dry locations where it is:
      - (1) Not subject to damage.
      - (2) Not in contact with earth.
      - (3) Not in concrete.
    - b) For metal conduit systems, flexible steel conduit is required for final connections to indoor mechanical equipment.
  - 3) Schedule 40 Polyvinyl Chloride (PVC) Conduit:
    - a) Allowed for use only underground or below concrete with galvanized rigid steel or IMC elbows and risers.
  - 4) Listed, Liquid-Tight Flexible Metal Conduit:
    - a) Use in outdoor final connections to mechanical equipment, length not to exceed **36 inches (900 mm)**.
  - 5) Pre-wired **3/8 Inch (9.5 mm)** Flexible Fixture Whips: Allowed only for connection to recessed lighting fixtures, lengths not to exceed **72 inches (1 800 mm)**.
- c. Prohibited Raceway Materials:
- 1) Aluminum conduit.
  - 2) Armored cable type AC (BX) cable.
3. Raceway And Conduit Fittings:
- a. Rigid Steel Conduit And IMC: Threaded and designed for conduit use.
  - b. EMT:
    - 1) Compression type.

- 2) Steel set screw housing type.
- c. PVC Conduit:
  - 1) PVC type. Use PVC adapters at all boxes.
  - 2) PVC components, (conduit, fittings, cement) shall be from same Manufacturer.
- d. Flexible Steel Conduit: Screw-in type.
- e. Liquid-tight Flexible Metal Conduit: Sealtite type.
- f. Expansion fittings shall be equal to OZ Type AX sized to raceway and including bonding jumper.
- g. Prohibited Fitting Materials:
  - 1) Crimp-on, tap-on, indenter type fittings.
  - 2) Cast set-screw fittings for EMT.
  - 3) Spray (aerosol) PVC cement.
4. Outlet Boxes:
  - a. Galvanized steel of proper size and shape are acceptable for all systems. Where metal boxes are used, provide following:
    - 1) Provide metal supports and other accessories for installation of each box.
    - 2) Equip ceiling and bracket fixture boxes with fixture studs where required.
    - 3) Equip outlets in plastered, paneled, and furred finishes with plaster rings and extensions to bring box flush with finish surface.
  - b. Non-metallic boxes may be used only for control voltage wiring systems.
  - c. Telephone / data outlet boxes shall be single device outlet boxes.
  - d. HVAC Instrumentation And Control:
    - 1) Junction boxes in mechanical equipment areas shall be 4 inches (100 mm) square.
    - 2) Boxes for remote temperature sensor devices shall be recessed single device.
    - 3) Boxes for thermostats shall be 4 inches (100 mm) square with raised single device cover.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
  1. Confirm dimensions, ratings, and specifications of materials to be installed and coordinate these with site dimensions and with other Sections.

### 3.2 INSTALLATION

- A. Interface With Other Work:
  1. Coordinate with Divisions 22 and 23 for installation of raceway for control of plumbing and HVAC equipment.
  2. Coordinate with Division 27 for installation of raceway for sound system.
  3. Before rough-in, verify locations of boxes with work of other trades to insure that they are properly located for purpose intended.
    - a. Coordinate location of outlet for water coolers with Division 22.
    - b. Coordinate location of outlets adjacent to or in millwork with Division 06 before rough-in. Refer conflicts to Architect and locate outlets under his direction.
  4. Coordinate installation of floor boxes in carpeted areas with carpet installer to obtain carpet for box covers.
  5. Install pull wires in raceways installed under this Section where conductors or cables are to be installed under other Divisions.
- B. General:
  1. Sound system electrical components furnished by Division 27 and installed under this Section include following items:
    - a. Speaker mounting rings.
    - b. Speaker enclosures.

## C. Conduit And Raceway:

1. Conceal raceways within ceilings, walls, and floors, except at Contractor's option, conduit may be exposed on walls or ceilings of mechanical equipment areas and above acoustical panel suspension ceiling systems. Install exposed raceway runs parallel to or at right angles to building structure lines.
2. Seal all raceways penetrating fire rated walls, ceilings and barriers. See Section 07 8400.
3. Keep raceway runs **6 inches (150 mm)** minimum from hot water pipes.
4. Make no more than four quarter bends, 360 degrees total, in any conduit run between outlet and outlet, fitting and fitting, or outlet and fitting.
  - a. Make bends and offsets so conduit is not injured and internal diameter of conduit is not effectively reduced.
  - b. Radius of curve shall be at least minimum indicated by NFPA 70.
5. Cut conduit smooth and square with run and ream to remove rough edges. Cap raceway ends during construction. Clean or replace raceway in which water or foreign matter have accumulated.
6. Install insulated bushings on each end of raceway **1-1/4 inches (32 mm)** in diameter and larger, and on all raceways where cables emerge. Install expansion fittings where raceways cross building expansion joints.
7. Run two spare conduits from each new panelboard to ceiling access area or other acceptable accessible area and cap for future use.
8. Bend PVC conduit by hot box bender and, for PVC **2 inches (50 mm)** in diameter and larger, expanding plugs. Apply PVC adhesive only by brush.
9. Installation In Framing:
  - a. Do not bore holes in joists or beams outside center 1/3 of member depth or within **24 inches (600 mm)** of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width.
  - b. Holes shall be **one inch (25 mm)** diameter maximum.
10. Underground Raceway And Conduit:
  - a. Bury underground raceway installed outside building **24 inches (600 mm)** deep minimum.
  - b. Bury underground conduit in planting areas **24 inches (600 mm)** deep minimum. It is permissible to install conduit **6 inch (150 mm)** below concrete sidewalks, however, conduit must be buried **24 inches (600 mm)** deep at point of exit from planting areas.
11. Conduit And Raceway Support:
  - a. Securely support raceway with approved straps, clamps, or hangers, spaced as required.
  - b. Do not support from mechanical ducts or duct supports without Architect's written approval. Securely mount raceway supports, boxes, and cabinets in an approved manner by:
    - 1) Expansion shields in concrete or solid masonry.
    - 2) Toggle bolts on hollow masonry units.
    - 3) Wood screws on wood.
    - 4) Metal screws on metal.
12. Prohibited Procedures:
  - a. Use of wooden plugs inserted in concrete or masonry units for mounting raceway, supports, boxes, cabinets, or other equipment.
  - b. Installation of raceway that has been crushed or deformed.
  - c. Use of torches for bending PVC.
  - d. Spray applied PVC cement.
  - e. Boring holes in truss members.
  - f. Notching of structural members.
  - g. Supporting raceway from ceiling system support wires.
  - h. Nail drive straps or tie wire for supporting raceway.

## D. Boxes:

1. Boxes shall be accessible and installed with approved cover.
2. Do not locate device boxes that are on opposite sides of framed walls in the same stud space. In other wall construction, do not install boxes back to back.
3. Locate boxes so pipes, ducts, or other items do not obstruct outlets.

4. Install outlets flush with finished surface and level and plumb.
5. Support switch boxes larger than two-gang with side brackets and steel bar hangers in framed walls.
6. At time of substantial completion, install blank plates on uncovered outlet boxes that are for future use.
7. Location:
  - a. Install boxes at door locations on latch side of door, unless explicitly shown otherwise on Contract Drawings. Verify door swings shown on electrical drawings with architectural drawings, and report discrepancies to Architect before rough-in. Distance of box from jamb shall be 6 inches (150 mm) from door jamb.
  - b. Properly center boxes located in walls with respect to doors, panels, furring, trim and consistent with architectural details. Where two or more outlets occur, space them uniformly and in straight lines with each other, if possible.
  - c. Center ceramic tile boxes in tile.

**END OF SECTION**

**SECTION 26 2417****CIRCUIT-BREAKER PANELBOARDS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install circuit-breaker panelboards as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. National Fire Protection Association:
    - a. NFPA 70E: 'Standard for Electrical Safety in the Workplace' (2018 or most recent edition adopted by AHJ).

**PART 2 - PRODUCTS****2.1 EQUIPMENT**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Cutler-Hammer Inc, Pittsburgh, PA [www.eatonelectric.com](http://www.eatonelectric.com).
    - b. General Electric Industrial Systems, Charlotte, NC [www.geindustrial.com](http://www.geindustrial.com).
    - c. Siemens Energy & Automation, Alphrata, GA [www.sea.siemens.com](http://www.sea.siemens.com).
    - d. Square D Co, Palatine, IL [www.us.squared.com](http://www.us.squared.com).
- B. Performance:
  - 1. Capacities:
    - a. Panelboard:
      - 1) Minimum integrated equipment short circuit rating of 22,000 amperes for 120 / 208 Volts.
      - 2) Minimum integrated equipment short circuit rating of 50,000 amperes for 277 / 280 Volts.
      - 3) Rated for use as service entrance equipment.
    - b. Lighting And Appliance Panelboards:
      - 1) Minimum integrated equipment short circuit rating of 10,000 amperes for 120 / 208 Volts.
      - 2) Minimum integrated equipment short circuit rating of 14,000 amperes for 277 / 480 Volts.
    - c. Load Centers:
      - 1) 125 Amp main lugs, 120 / 208 Volt, three-phase.
      - 2) Minimum integrated equipment short circuit rating of 10,000 Amps.
- C. Material:
  - 1. Circuit-breaker type.
  - 2. Galvanized steel cabinets
  - 3. Bussing and lugs arranged as required.

4. Multi-pole circuit-breakers shall be common trip.
5. Circuit-breakers shall be molded case thermal magnetic type with inverse time characteristics.
6. Lighting And Appliance Panelboards:
  - a. Plug-on or bolt-on breakers. Multi-pole breakers shall be common trip.
  - b. Factory installed or provided circuit number identification for each breaker and space.
  - c. Cabinets shall be locking type with no exposed latches or screws when door is closed. Key panels alike and provide minimum of three keys.
  - d. Minimum dimensions of 20 inches (500 mm) wide by 5-3/4 inches (146 mm) deep.
  - e. Space designation on Drawings indicates bus hardware and panelboard capacity for future acceptance of one 20 Amp, single-pole circuit-breaker.
  - f. Breakers specified to be shunt trip and shall include shunt trip accessories to remotely trip breaker using separate 120 V power source. Trip coil shall include coil-clearing contact to break coil current when breaker opens.
  - g. Use equipment from same manufacturer as main panelboard.
  - h. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Type PRL1a by Cutler-Hammer.
    - 2) Type AL or AQ by General Electric.
    - 3) Type P1 by Siemens.
    - 4) Type NQOD by Square D.
7. Load Centers:
  - a. Surface-mounted, outdoor NEMA Type 3R enclosure with padlocking provisions. 12-1/2 inches (318 mm) wide by 4-1/2 inch (115 mm) deep minimum.
  - b. HACR type circuit breakers.
  - c. Use equipment from same manufacturer as main panelboard.
  - d. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Type CH by Eaton.
    - 2) Type PowerMark Plus by General Electric.
    - 3) Type PL by Siemens.
    - 4) Type QO by Square D.
8. Labels:
  - a. All Switchboards shall be labeled with Arc-Flash Hazard Information per NFPA 70E 130.5 including:
    - 1) Nominal system voltage.
    - 2) Arc flash boundary.
    - 3) Available incident energy.
    - 4) Working distance.
    - 5) Minimum arc rating of clothing.
    - 6) Level of PPE.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
  1. Examine wall framing and verify framing for proper spacing for installation of panelboard(s).
    - a. Notify Architect of improper spacing in writing.
- B. Contractor shall be responsible for performing required calculations to determine ARC Flash Hazards and providing all appropriate labeling per NFPA 70E.

### 3.2 INSTALLATION

- A. Label panelboards, load centers, and each breaker in main panelboard with 1/16 inch (1.6 mm) thick laminated plastic composition material with contrasting color core. Engraved letters shall be 1/4 inch (6 mm) high.

- B. Provide typewritten circuit schedules in lighting and distribution panelboards and load centers to identify panelboard and load served by each branch breaker.
- C. Arrange conductors neatly within panelboards and load centers.
- D. Secure to structure in accordance with requirements of Project seismic design category.

### **3.3 PROTECTION**

- A. Protect panelboards, load centers, and interior components from paint, gypsum board compound, dirt, dust, and other foreign matter during construction.

**END OF SECTION**

**SECTION 26 2726****WIRING DEVICES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install wiring devices complete with plates as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.

**PART 2 - PRODUCTS****2.1 COMPONENTS**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Cooper Wiring Devices, Peachtree City, GA [www.cooperwiringdevices.com](http://www.cooperwiringdevices.com).
    - b. General Electric Industrial Systems, Charlotte, NC [www.geindustrial.com](http://www.geindustrial.com).
    - c. Hubbell Building Automation, Austin, TX [www.hubbell-automation.com](http://www.hubbell-automation.com).
    - d. Hubbell Inc, Milford, CT [www.hubbell-wiring.com](http://www.hubbell-wiring.com) or Hubbell Canada Inc, Pickering, ON (800) 263-4622 or (905) 839-4332.
    - e. Hunt Control Systems Inc, Fort Collins, CO [www.huntdimming.com](http://www.huntdimming.com).
    - f. Intermatic Inc, Spring Grove, IL [www.intermatic.com](http://www.intermatic.com).
    - g. IR-TEC America, Inc., Brea, CA [www.irtec.com/en-ira/](http://www.irtec.com/en-ira/).
    - h. Leviton Manufacturing Co, Little Neck, NY [www.leviton.com](http://www.leviton.com) or Leviton Manufacturing of Canada Ltd, Pointe-Claire, QB (800) 461-2002 or (514) 954-1840.
    - i. Legrand, West Hartford, CT [www.legrand.us.com](http://www.legrand.us.com) or Vaughan, ON [www.legrand.ca.com](http://www.legrand.ca.com).
    - j. Lutron Electronics Co Inc, Coopersburg, PA [www.lutron.com](http://www.lutron.com).
    - k. Ortronics, New London, CT [www.ortronics.com](http://www.ortronics.com).
    - l. Paragon Electric Co Inc, Carol Stream, IL [www.icca.invensys.com/paragon](http://www.icca.invensys.com/paragon) or Paragon Electric, Mississauga, ON (800) 951-5526 or (905) 890-5956.
    - m. Pass & Seymour, Syracuse, NY [www.passandseymour.com](http://www.passandseymour.com) or Pass & Seymour Canada Inc, Concord, ON (905) 738-9195.
    - n. Philips Lighting Co, Somerset, NJ [www.lighting.philips.com/nam](http://www.lighting.philips.com/nam) or Philips Lighting Canada, Scarborough, ON (416) 292-3000.
    - o. Red Dot div of Thomas & Betts, Memphis, TN [www.tnbcom](http://www.tnbcom).
    - p. Schneider Electric North America, Palatine, IL [www.schneider-electric.com](http://www.schneider-electric.com) (847) 397-2600.
    - q. Sensorswitch, Wallingford, CT [www.sensorswitch.com](http://www.sensorswitch.com).
    - r. Siemon Company, Watertown, CT [www.siemon.com](http://www.siemon.com).
    - s. Square D Co, Palatine, IL [www.squared.com](http://www.squared.com).
    - t. Suttle, Hector, MN [www.suttleonline.com](http://www.suttleonline.com).
    - u. Tork Inc, Mount Vernon, NY [www.tork.com](http://www.tork.com).
    - v. Watt Stopper Inc, Santa Clara, CA [www.wattstopper.com](http://www.wattstopper.com).
  - 2. Product Options:
    - a. Faces shall be nylon where available.
    - b. Devices of single type shall be from same Manufacturer.
    - c. Devices are listed as white. Use white devices on light colored walls, brown on dark colored walls, and black on black walls.

- B. Switches:
1. Furnace Disconnect:
    - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) 20 AMP, single pole:
        - a) Cooper: 2221V.
        - b) Hubbell: HBL1221-I.
        - c) Pass & Seymour: 20AC1-I.
        - d) Leviton: 1221-2I.
- C. Receptacles:
1. Standard Style:
    - a. 15 AMP, specification grade, back and side wired, self grounding, tamper resistant.
    - b. Verified by UL to meet Fed Spec WC-596F.
    - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) Cooper: TR5262.
      - 2) Hubbell: BR20.
      - 3) Leviton: TBR20.
      - 4) Pass & Seymour: TR20.
  2. Ground Fault Circuit Interrupter (GFCI):
    - a. 15 AMP, specification grade.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) Cooper: GF15W.
      - 2) Hubbell: GF5252WA.
      - 3) Leviton: 8599-W.
      - 4) Pass & Seymour: 1594-W.
- D. Plates:
1. Standard Cover Plates:
    - a. Office / Occupied Areas:
      - 1) Nylon or high impact resistant thermoplastic.
      - 2) Color shall match wiring device.
    - b. All Other: Steel.
    - c. Ganged switches shall have gang plates.
    - d. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
      - 1) Cooper.
      - 2) Hubbell.
      - 3) Leviton.
      - 4) Pass & Seymour.
  2. Weatherproof In-Use Receptacle Covers:
    - a. NEMA 3R rated.
    - b. Cast aluminum.
    - c. Compatible with GFCI receptacles.
    - d. Complete with weather resistant gaskets and stainless steel screws.
    - e. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) Hubbell: WP26MH, horizontal; WP26M, vertical.
      - 2) Intermatic: WP1010HMC, horizontal; WP1010MC, vertical.
      - 3) Red Dot: CKMG, horizontal; CKMGV, vertical.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install devices flush with walls, straight, and solid to box.

**END OF SECTION**

**SECTION 26 2816****ENCLOSED SWITCHES AND CIRCUIT BREAKERS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install disconnects as described in Contract Documents, except those provided integral with equipment.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.

**PART 2 - PRODUCTS****2.1 ASSEMBLIES**

- A. Manufacturers:
  - 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.
    - a. Disconnects: Same as Manufacturer of Project's main panelboard.
    - b. Fuses.
      - 1) Cooper Bussmann, Ellisville, IL [www.cooperbussmann.com](http://www.cooperbussmann.com).
      - 2) Edison Fuse, Ellisville, IL (314) 391-3443.
      - 3) Ferraz Shawmut, Newburyport, MA [www.ferrazshawmut.com](http://www.ferrazshawmut.com).
      - 4) Littelfuse Inc, Des Plaines, IL [www.littelfuse.com](http://www.littelfuse.com).
- B. Disconnects:
  - 1. Heavy-duty quick-make, quick-break type, non-fused unless indicated otherwise.
  - 2. Provide interlock to prevent opening of door when switch is in ON position.
  - 3. Provide means to lock switch in OFF position with padlock.
  - 4. Disconnects for motor circuits shall be horsepower rated.
  - 5. Disconnects For Furnace Units And Unit Heaters: Provide manual starter with thermal overload relay. Provide overload relay to match motor full load amps.
  - 6. Enclosures:
    - a. Interior: NEMA / CEMA Type 1.
    - b. Exterior: NEMA / CEMA Type 3R.
  - 7. Fuses:
    - a. Fuse fused disconnects with dual-element time delay fuses and equip with rejection type fuse holders.
    - b. Fuses on Project shall be from single manufacturer.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Label disconnects to indicate equipment served, such as Condensing Unit CU-1. Use **1/16 inch (1.6 mm)** thick laminated plastic composition material with contrasting color core. Engraved letters shall be **1/4 inch (6 mm)** high. Attach labels with screws.
- B. Install furnace disconnects on furnace at location where it is accessible from front of unit and it does not interfere with unit's operation.

**END OF SECTION  
END OF DIVISION**

**DIVISION 28: ELECTRONIC SAFETY AND SECURITY**

**28 3000 DETECTION AND ALARM**

28 1644 CONDENSER THEFT PROTECTION SYSTEM

END OF TABLE OF CONTENTS

**SECTION 28 1644****CONDENSER THEFT PROTECTION SYSTEM****PART 1 - GENERAL****1.1 SUMMARY**

## A. Includes But Not Limited To:

1. Furnish and install zoned building security system as described in Contract Documents.

## B. Related Requirements:

1. Section 26 0501: 'Common Electrical Requirements'.
2. Section 26 0523: 'Control-Voltage Electrical Cables'.
3. Section 26 0633: 'Raceway And Boxes For Electrical Systems'.
4. Division 26: 'Electrical' for providing conduit and boxes for system.

**1.2 REFERENCES**

## A. Reference Standards:

1. National Fire Protection Association:
  - a. NFPA 731, Standard for the Installation of Electronic Premises Security Systems' (2017 or most recent edition adopted by AHJ).

**1.3 SUBMITTALS**

## A. Action Submittals:

1. Product Data:
  - a. Manufacturer's original catalog data and descriptive information on each piece of equipment to be used.
  - b. Manufacturer's written installation instructions.
  - c. Manufacturer's written maintenance and operation instructions.
  - d. Shop Drawings:
    - 1) Prepared by authorized factory representative and including:
    - 2) Single line diagram of actual system. Typical riser diagrams are not acceptable.
    - 3) Complete wiring diagrams.

## B. Informational Submittals:

1. Special Procedure Submittals:
  - a. Provide Operational Instructions:
    - 1) Activation or reset of system.
    - 2) Temporary deactivation.
    - 3) Temporary bypass of one or more condensing units.
    - 4) Battery replacement requirements.
    - 5) Testing procedures.
  - b. Installer must provide attachment 'Record of Completion Inspection & Testing Report' signed by Installer and used for verification before Closeout Test specified in 'Field Quality Control' in Part 3 of this specification.

## C. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Operations and Maintenance Data:
    - 1) Operation Manual:
      - a) Electronic (PDF) and hard copy version.
    - 2) Maintenance and operational instructions:

- a) Battery replacement schedule.
- b) Recommended backup procedures and schedule.
- c) Special Procedure Submittals.
- 3) Contact Information:
  - (1) Provide name, address, and phone numbers including 24/7 contact if available.
- b. Warranty Documentation:
  - 1) Final, executed copies of Warranties on Alarm Panel and all system components.
- c. Record Documentation:
  - 1) Manufacturers documentation:
    - a) Manufacturer's literature or cut sheet for each item of system.
    - b) Manufacturer's operating system backup.
    - c) Two (2) keys to control box.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. System shall be recognized for intended use by applicable building codes and AHJ.
  - 2. Alarm Panel Underwriters Laboratories listed.
- B. Qualifications:
  - 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
    - a. Distributor approved.
    - b. Comply with specifications and Contract Documents.

#### 1.5 WARRANTY

- A. Manufacturer Warranty and Extended Warranties:
  - 1. Master Controller:
    - a. Manufacturer's Warranty against faulty workmanship and materials:
      - 1) Honeywell five (5) year warranty.
      - 2) Nepeco five (5) year warranty.
  - 2. Other Parts:
    - a. Manufacturer's Warranty on each component.
- B. Special Warranty:
  - 1. Distributor's ninety (90) day no questions asked return of product guarantee.
  - 2. Distributor's one (1) year guarantee covering installation:

### PART 2 - PRODUCTS

#### 2.1 SYSTEMS

- A. Distributors:
  - 1. Category Four Approved Distributors. See Section 01 6200 for definitions of Categories:
    - a. Atkinson Electronics Inc. (AEI), 14 West Vine Street, Murray, UT 84107:
      - 1) Contact Information: Mike Bailey: office (801) 261-3600, cell, (801) 381-0666, email [MikeB@atkinsonel.com](mailto:MikeB@atkinsonel.com).
    - b. Intermountain Lock & Security Supply, 3105 South Main Street, Salt Lake City, UT, 84115:
      - 1) Contact Information: Marc W Zaharias: cell (801) 556-8986, office (801) 486-0079, [marc.zaharias@imlss.com](mailto:marc.zaharias@imlss.com).
- B. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Atkinson Electronics, Inc., Salt Lake City, UT [www.atkinsonelectronics.com](http://www.atkinsonelectronics.com).

- b. Functional Devices, Inc. (RIB) Russiaville, IN [www.functionaldevices.com](http://www.functionaldevices.com).
- c. George Risk Industries, Kimball, NE [www.grisk.com](http://www.grisk.com).
- d. Honeywell Security, Melville, NY [www.security.honeywell.com](http://www.security.honeywell.com).
- e. JB Industries Inc. Aurora, IL [www.jbind.com](http://www.jbind.com).
- f. Linear LLC (subsidiary of Nortek, Inc.), Carlsbad, CA [www.linearcorp.com](http://www.linearcorp.com).
- g. MARS Motors & Armatures Inc. Hauppauge, NY [www.mar-sm-a.com](http://www.mar-sm-a.com).
- h. Maxwell Security Signs & Decals, Chatsworth, CA [www.maxwellmfg.com](http://www.maxwellmfg.com).
- i. Napco Security Technologies, Inc., Amityville, NY [www.napcosecurity.com](http://www.napcosecurity.com).
- j. Potter Electric Signal Company, LLC, St. Louis, MO [www.pottersignal.com](http://www.pottersignal.com).
- k. Starlite Security Devices, LLC., Griffin, GA [www.thewhip.com](http://www.thewhip.com).

C. Description:

- 1. Electronic alarm for condenser theft protection system.

D. Design Criteria:

- 1. Furnish and install complete condenser theft protection system as described in Contract Documents including:
  - a. System shall include all necessary alarm system, cables, connectors, sensors, power supplies, battery back-up, telephone interface and connection cables and accessories for complete operational condenser theft prevention system.

E. Components:

- 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a. Atkinson Electronics:
    - 1) Control Panel:
      - a) Honeywell Vista 20P Control Panel pak/buildup (up to 15 monitor zones) with:
        - (1) Transformer.
        - (2) Battery Back-up.
        - (3) Phone Jack.
        - (4) Cord.
        - (5) Dialer with Contact ID.
        - (6) Honeywell 4204 relay module.
        - (7) Altronix SMP3 power supply board with 5amp hour battery backup.
    - 2) Keypads:
      - a) Honeywell: 6150:
        - (1) Typically mounted on control panel.
    - 3) Zone Expansion Module:
      - a) Honeywell: 4219:
        - (1) Expands additional 15 zones up to 48 zones total.
    - 4) Pressure Switches:
      - a) MARS Motors & Armatures: 43341:
        - (1) Refrigerant low press sensor (opens at 5 psig (34.5 kPa) closes at 20 psig (138 kPa).
      - b) Starlite Security: The Whip TW-8100 (+AD-410 adapter for mini-splits):
        - (1) Refrigerant low press sensor opens at 5 psi (34.5 kPa) and closes at 20 psi (138 kPa). Install using built in resistance.
        - (2) For existing projects, mounted outside using screw on T if mounting inside not available.
    - 5) Swivel Tee & Valve Core:
      - a) JB (Just Better) Industries: A31852 / C&D Valve CD4460:
        - (1) Existing projects: mounted outside using a screw on T if mounting inside not available.
    - 6) Electrical Relay (power loss sensor) for existing buildings:
      - a) Functional Devices (RIB): RIBU1C:
        - (1) Provide power loss sensor with individual disconnects.
        - (2) Install in condensing unit.
    - 7) Electrical Temper Switch:
      - a) George Risk: TSC20 Clip Tamper Switch:
        - (1) Each condenser top monitoring.
        - (2) Each electrical load center.

- 8) Electrical Temper Switch/System:
  - a) For large condenser units.
  - b) Linear: Copper Cop CC3008 Air Conditioning Protection System:
    - (1) Cable harness and interconnection box.
    - (2) CC3008XT: 30 foot (9.15 m) extension cable, available if required.
- 9) Siren/Strobe:
  - a) Potter: Amseco SSX-52SB:
    - (1) 120 DB Siren/strobe combo with blue light.
    - (2) Install with Siren and Strobe circuits separated.
- 10) Wireless Device (existing buildings):
  - a) Honeywell: 5800 Series:
    - (1) Option that provides overall installation cost savings only.
- 11) Decal Alarm Sticker:
  - a) Atkinson Electronics: DA001 Alarm Sticker:
    - (1) One (1) for each condenser and one (1) for each refrigerant line cover and disconnect/load center.
- b. Intermountain Lock and Security:
  - 1) Control Panel:
    - a) Napco: IMLK120-pak/buildup (up to 16 monitor zones):
      - (1) With Transformer, Battery Back-up, Phone Jack, Cord, Dialer with Contact ID.
  - 2) Keypads:
    - a) Napco: GEM-K4RF:
      - (1) Typically mounted on control panel.
  - 3) Zone Expansion Module:
    - a) Napco: GEM-EZM4/8:
      - (1) Expands additional 16 zones up to 32 zones total.
  - 4) Pressure Switches:
    - a) Starlite Security: The Whip TW-8100 (+AD-410 adapter for mini-splits):
      - (1) Refrigerant low press sensor opens at 5 psi (34.5 kPA) and closes at 20 psi (138 kPA). Install using built in resistance.
      - (2) For existing projects, mounted outside using screw on T if mounting inside not available.
  - 5) Swivel Tee & Valve Core:
    - a) JB (Just Better) Industries: A31852:
      - (1) Includes cap and one (1) valve core A31999.
  - 6) Door Magnetic Contacts or Plunger Switch (Tamper Switch):
    - a) Door contact sensor for each Load Center.
    - b) Sensor for top of condensing unit.
  - 7) Electrical Relay (power loss sensor) for existing buildings:
    - a) Functional Devices (RIB): RIBU1C:
      - (1) Provide power loss sensor with individual disconnects.
      - (2) Install in condensing unit.
  - 8) Electrical Temper Switch:
    - a) Door Magnetic Contacts, GRI 28 A:
      - (1) Each electrical load center.
    - b) HVAC Kit with Tilt Sensors- GRI HVAC Kit (includes two (2) sensors per condenser):
      - (1) Each condenser top monitoring.
  - 9) Electrical Temper Switch/System:
    - a) For large condenser units.
    - b) Linear: Copper Cop CC3008 Air Conditioning Protection System:
      - (1) Cable harness and interconnection box.
      - (2) CC3008XT: 30 foot (9.15 m) extension cable, available if required.
  - 10) Siren/Strobe:
    - a) Potter: Amseco SSX58SB:
      - (1) 120 DB Siren/strobe combo with blue light.
      - (2) Install with Siren and Strobe circuits separated.
  - 11) Wireless device:
    - a) Napco: NAP GEM-RECV8:

- b) Option that provides overall installation cost savings only.
- 12) Decal alarm sticker:
  - a) Maxwell Security: MXEDY103:
    - (1) One for each condenser and one for each refrigerant line cover and disconnect/load center.
    - (2) 4 inch (100 mm) x 3 inch (76 mm).
- 2. Type One Acceptable Products:
  - a. Communications Cabling:
    - 1) AWG # 22 jacketed cable, 1 pair, acceptable for free air and non-plenum installations.
    - 2) Use plenum rated where required.
  - b. Power Cabling:
    - 1) AWG # 18 jacketed cable, 2 pair, acceptable for free air and non-plenum installations.
    - 2) Use plenum rated where required.
  - c. Keypad Cabling:
    - 1) Included with panel kit.
    - 2) For remote keypad locations use AWG # 22 jacketed cable, 2 pair, acceptable for free air and non-plenum installations.
      - a) Use plenum rated where required.
  - d. Equal as approved by Architect before bidding. See Section 01 6200.

## PART 3 - EXECUTION

### 3.1 INSTALLERS

- A. Category Two Approved Installers. See Section 01 6200 for definitions of Categories:
  - 1. Atkinson Electronics Inc. (AEI):
    - a. <Insert List of Installers>.
  - 2. Intermountain Lock & Security Supply:
    - a. <Insert List of Installers>.

### 3.2 EXAMINATION

- A. Verification Of Conditions:
  - 1. Examine building conditions and verify it suitable for installation of system:
  - 2. Notify Architect of unsuitable conditions in writing.
  - 3. Commencement of Work by installer is considered acceptance of substrate.

### 3.3 INSTALLATION

- A. General:
  - 1. Install condenser theft protection system as per Manufacturer's and Distributor's written instructions.
  - 2. Installation shall be coordinated with Church security and Global Security Operations Center (GSOC) for complete connection of system to Church's security system, using contact ID reporting format.
  - 3. Provide all components, connections, terminations, etc and programming necessary for complete functioning and commissioned installation.
  - 4. Install End Of Line zone resistors on all items following Manufacture's requirements.
  - 5. Set security panel output relays to 'loop follow, non-latching' configuration.
  - 6. Provide start up by Manufacture's trained representative.
- B. Cables:
  - 1. Conductors shall be continuous. Do not splice cables.
  - 2. Label and identify both ends of each jacketed cable with project cable number. Labels shall be Brady or equivalent.

3. Conceal cable to door and window contacts. Exposed cable on interior finished surfaces not permitted.

C. Mounting Heights:

1. Unless otherwise indicated, mount center of outlets or boxes at following heights above finish floor:
  - a. Control Panel: **62 inches (1 800 mm)**.
  - b. Keypad: Usually mounted on the control panel if mounted separate mount at **54 inches (1 350 mm)**.
  - c. Mount control panel in a locked area/room.
2. Comply with all NEC article 110 clearance requirements.

### 3.4 SEQUENCES OF OPERATION

A. Initiating devices: All security systems shall initiate annunciating procedures by at least one of following methods:

1. Electrical tamper switch.
2. Power loss sensor.
3. Door Magnetic Contacts or plunger switch (tamper switch).
4. Refrigerant pressure loss switch.
5. Copper Cop.

B. Annunciating procedures: upon activation of any initiating device the system shall do as follows:

1. Activate siren for set time.
2. Activate strobe until system is reset.
3. Dial out to the Global Security Operations Center (GSOC) using contact ID data transfer protocols.

C. Panel shall auto arm.

D. Maintenance procedures: the system shall allow for the following functions:

1. Operator shall be able to override the system for maintenance of the condensing unit(s).
2. Operator shall be able to manually activate annunciation procedure to perform functional tests.
3. Operator shall be able reset the system to its initial state.
4. Display shall be provided at the panel to provide initiation device identification and trouble messages.
5. All trouble messaged and codes shall be posted at the panel for ready access and interpretation.
6. A means within control panel to by-pass any initiating device shall be provided while keeping all other devices active with alarming capability.

### 3.5 FIELD QUALITY CONTROL

A. Field Tests:

1. Verification Test:
  - a. Conducted prior to Closeout Test.
  - b. Installer to submit 'Record of Completion Inspection & Testing Report' attachment as specified in 'Special Procedure Submittals' under 'Informational Submittals' in Part 1 of this specification.
  - c. Verify all alarm points are operational and correctly identified to Global Security Operations Center (GSOC).
  - d. Verify all points alarm with Global Security Operations Center (GSOC).
2. Closeout Test:
  - a. Conduct Closeout Test of system in presence of Owner and show system to be free of defective workmanship and materials.
  - b. All systems shall be tested and meet requirements of NFPA 731 test methods table.

B. Non-Conforming Work:

1. Replace system components that fail to perform as designed.

- 2. Correct all work not in compliance to Contract Documents at no additional cost to Owner.

**3.6 CLEANING**

A. Waste Management:

- 1. Perform daily clean-up to collect wrappings, empty containers, paper, and other debris from project site.
- 2. Upon completion, debris must be disposed of in legally acceptable manner.

**3.7 CLOSEOUT ACTIVITY**

A. Instruction Of Owner:

- 1. General:
  - a. Instruct Owner's Representative in proper operation and maintenance procedures.
  - b. Provide floor plan(s) indicating location and system address for all devices in Owner's manual and post copy at access control panel.
- 2. Training Session:
  - a. Perform up to three (3) hour maximum training session for Owner's Representative(s) demonstrating operation and maintenance of completed systems.
    - 1) System operational instructions.
    - 2) System maintenance procedures.
      - a) Backup procedures and schedule.
      - b) Battery replacement schedule.

**3.8 PROTECTION**

- A. Protect cable from cuts, abrasion, and other damage during construction.

**END OF SECTION**

**ATTACHMENTS**

# RECORD OF COMPLETION INSPECTION & TESTING REPORT

## PROJECT INFORMATION (available from project specification)

Project Name: \_\_\_\_\_

Project Number: \_\_\_\_\_

Project Address: \_\_\_\_\_

## ALARM INSTALLATION COMPANY

License #: \_\_\_\_\_

Name:: \_\_\_\_\_

Address: \_\_\_\_\_

Representative: \_\_\_\_\_

Signature: \_\_\_\_\_

Printed Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Telephone: \_\_\_\_\_

## OFF – PREMISES MONITORING

GSOC Central Station (Global Security Operations Center, The Church of Jesus Christ of Latter-day Saints).  
If GSOC is not required, Justification and approval to use other monitoring.

\_\_\_\_\_

Central Station: \_\_\_\_\_

Proprietary Station: \_\_\_\_\_

Law Enforcement Center: \_\_\_\_\_

## SYSTEM POWER SUPPLIES

Primary (Main): \_\_\_\_\_ Nominal Voltage: \_\_\_\_\_ Amps \_\_\_\_\_

Overcurrent Protection: Type: \_\_\_\_\_ Rating: \_\_\_\_\_

Location of disconnection means: \_\_\_\_\_

Disconnection means (panel and breaker number: \_\_\_\_\_

\_\_\_\_\_